

Ecology and Distribution of the Butterflies of Southern Central Colorado

James A. Scott
and
Glenn R. Scott

60 Eses Street, Lakewood, Colorado 80226 and
United States Geological Survey, Federal Center,
Lakewood, Colorado 80226

Abstract. — The 160 resident and 18 migratory species of butterflies occurring in an area west of Pueblo, Colorado, were studied. The area contains a great variety of habitats from alpine tundra to plains grassland. Spatial and altitudinal distribution, habitats, number and timing of broods, and larval and adult foodplants, were studied. More than 100 new larval hostplant records are presented. Diversity is greatest in the foothills, and decreases with altitude except that the plains have low diversity similar to the high mountains above 10000'. Distributions within the area are very consistent with altitudinal temperature gradients. Mountain barriers have not prevented the spread of butterflies to suitable habitats throughout the area. Postglacial warm periods apparently caused the extinction of alpine butterflies on Greenhorn Peak which is now above timberline. The area's butterflies are mainly western North American in distribution. Species composition differs somewhat from another mountain fauna just north of the area, due to an increased percentage of northern species there; both areas have similar percentages of eastern and western species. 109 of the 160 native species have only one brood per year. Time of flight is generally later at high altitude. Few one-brood species fly after July. At low altitude multi-brood species predominate. Ten populations differ in appearance from populations outside the area; these are described but not named. Most species in the Pueblo area occur in many plant associations. The most distinctive butterfly associations are those of the alpine zone and of riparian habitats. Other species are mostly restricted to pinyon-juniper woodland, *Cercocarpus* chaparral, or grassland habitats. Several species distributions are influenced by geological substrate. Most species often feed as adults, on flowers especially. Some species feed only on sap; several never feed as adults. Sap-feeding usually occurs as an alternative strategy for species which never feed on flowers.

Introduction

This paper is a study of the ecology and distribution of the butterflies of southern Colorado, specifically the southern half of the Pueblo 1:250,000 quadrangle (Fig. 1). Its purpose is to summarize our data on spatial and altitudinal distribution, number of broods and time of flight of these broods, larval and adult food sources, and to interpret these data. Studies of mate-locating behavior and flight patterns of the butterflies of this area were published elsewhere (Scott, 1976a, 1976b).

The data herein were gathered during 1961 to 1977. From 1961 to 1968 our sampling surveys were incidental to geological surveys by Glenn Scott. From 1969 through 1974 geological studies were intensified, and James Scott sampled areas and seasons missed during the geological surveys. We gathered more than 4,050 species-locality records, where a locality is defined as five miles or more from another locality, and more than 10,000 species-day records. Except for certain small areas such as the mountains west of Denver, this area has now the best studied Rocky Mountain butterfly fauna. The distribution data are worth reporting because previously very few species were known from the area (Brown et al. 1957), and because many species differ from those found in adjacent areas covered by that work. We present a biogeographic analysis of distribution within and near the area. Several examples of the effect of geological substrate on distribution are presented.

Along with sampling distributions, from 1967 to 1973 we gathered information on larval and adult food sources whenever possible. We found more than 100 records of larval foodplants based on observations of oviposition or larval feeding (most represent new insect-plant associations), and many hundred records of adult feeding sources.

Results

Resident and temporary immigrant butterfly species are listed below in systematic order. For each species, the following are listed: number of localities where it is known to occur (a locality is defined as a place more than 5 miles from another), type of geographic area occupied ("foothills" means the eastern side of the Wet Mountains from about 6000-8000'; "mountains" refers to the Wet, Sangre de Cristo, or La Garita Mountains), altitudinal limits, habitat, number of broods by dates (when precise days are given, these are average dates of start or

end of a brood based on combined data from all years), variation with altitude, larval foodplants, and adult nectar sources. We list only larval foodplant specificity (a generalization of the detailed records) plus the records we have authenticated or discovered within the Pueblo area. Foodplant records will be fully documented in another paper. Abundances were arbitrarily rated from rare (few seen per year), uncommon (few seen per day), common (many seen per day), to abundant (many seen per hour). Place names are found on the map (Fig. 1) or on topographic maps of the United States Geological Survey. A few records cited by Nash (1893), Brown et al. (1957), and Cockerell (1890a, b, 1892a, b) are included.

Papilionidae

Parnassius phoebus. (*sayii* Edw. below timberline *hermodur*, H. Edws. above timberline) 33 localities: Wet and Sangre de Cristo ranges, 7000-13000'. One stray male was found near Westcliffe. Common in colonies in open grassland where *Sedum lanceolatum* abounds. One brood, June 18-August 2 (extremes May 26-Aug. 28) at about 9000' and early July-mid to late Aug. above timberline. Common to abundant. Adults feed often, mostly on yellow and white flowers including *S. lanceolatum* (the larval foodplant at Rosita; Scott 1973b) and on mud.

Papilio zelicaon nitra Edws. form *gothica* Rem. The black form *nitra* does not occur here, 5 loc. in the mountains: along the west side of the Wet Mountains, the Royal Gorge, at Pass Creek and La Veta Pass, and west of the San Luis Valley, 5800-11000'. One brood, April 12-May 30 at lower altitudes, June 10-July 28 at higher altitudes. Uncommon. Larval hosts many Umbelliferae, associated with *Harbouria trachypleura* on Pass Creek in Huerfano Co. *Papilio* adults often feed on flowers (especially bluish ones: *Cirsium*, *Medicago*, *Cleome*, *Monarda*, etc.) and mud.

Papilio polyxenes. asterias Stoll. 27 loc: throughout the area including the San Luis Valley floor, from 4300-9500' (and seen above timberline). Occurs in a variety of habitats (grassland, pinon-juniper, cities). Three broods on the plains, May 22-June 18, July 13-Aug. 16, and Sept. 2-Oct. 22; one brood in the mountains June 26-Aug. 27. Uncommon. Larval hosts are many cultivated and wild Umbelliferae.

Papilio bairdii Edw. 35 loc: plains (east of Canon City and Florence), Wet Mtn. foothills (Soda Gulch), Arkansas River Canyon (Royal Gorge to Nathrop) where it occurs within a few miles of the river but as far away as Hillside, and low hills on the west & south side of the San Luis

Valley. 4600-9600' (rare above 8000'). Pinon-juniper habitat in the last two areas. One small brood May 3 (plains) to mid June, a second larger flight late June to late August (peak July 30) which may represent two broods. Uncommon to rare in most years, common in 1965. Larvae feed on *Artemisia dracunculus* (larvae raised to adults from Canon City and Salida). Phenotypic variation is great; black forms ("*bairdii* ") were 73%, yellow forms ("*brucei* Edw.") 27%, of a large sample. Width of yellow bands of both forms in extremely variable, as are other characteristics. The side of the abdomen of black forms varies from solid black with yellow spots, to partly yellow; about a fourth of black forms, usually males, have some degree of abdominal yellow suffusion, and 2.5% of black forms (all males) have the side mostly yellow (form "*hollandii* Edw."). These percentages of forms are similar throughout the area.

P. glaucus rutulus Lucas. 49 loc: throughout the area except the San Luis and Wet Mtn. Valley floors, from 4800-10436' (usually below 9000') in riparian habitats. One brood, early June to mid July plains-foothills, to late July elsewhere (extremes May 29-Aug. 31) although rare late records may represent a partial second brood. Usually uncommon. Larval hosts *Salix* (larvae raised to adults at Pueblo), *Populus*, *Fraxinus* in California (A. Shapiro, written communication 1974), and perhaps also *Alnus*, *Betula*, and *Ptelea baldwinii*. *P. g. rutulus*, *P. eurymedon*, and *P. multicaudata* sometimes congregate at mud. *P. glaucus* and *P. g. rutulus* are provisionally treated as subspecies because they intergrade in British Columbia (Scott & Shepard 1976). Also, it has not been appreciated that *P. glaucus canadensis* is intermediate in wing pattern and biology between *glaucus* and *rutulus*. *P. g. glaucus* from West Virginia refuses *Salix* which *glaucus canadensis* in New England and *P. rutulus* both feed on in nature.

P. multicaudata Kirby. 36 loc: throughout the area except the Wet Mtn. and San Luis Valley floors, 4860-9100' (usually below 8000'), mainly in drier canyon bottoms than *P. g. rutulus*. Apparently two broods at low elevations, mid April to late May, mid June-early Aug. Apparently only one brood higher in the mountains, mid June-early Aug. Uncommon-common. Larval hosts Rosaceae: *Prunus* including *P. virginiana* and *P. americana*, *Amelanchier*; Oleaceae: *Fraxinus*; Rutaceae: *Ptelea baldwini*.

P. eurymedon Lucas. 3 loc.(?): Juanita Scott found a dead male beside the road on the west side of the Sangre de Cristo Mts. west of

La Veta Pass near Russell (June 21, 8700'). Nash (1893) recorded the species from Rye (6800') in the Wet Mtn. foothills, and A. Detmar caught a worn specimen at Greenleaf Creek on the east side of the Sangre de Cristo Mts. (Aug., about 8800') which he discarded before I could examine it. Probable Arkansas Canyon and Huerfano Park. 6800-8800', in mountainous areas. One brood, usually June-July elsewhere. Rare in this area, and some or all of the three records may be erroneous. Larval hosts *Ceanothus fendleri*, *Crataegus*, *Ribes*, *Holodiscus*.

P. cresphontes Cram. Strays from farther south were found at Rye (Denver Museum of Natural History collection) and Pueblo (Brown et al. 1957).

Battus philenor (Linn.). Strays were found at Pueblo, Rosita, Hardscrabble Canyon (Nash, 1893), Rye (Denver Museum collection), and Round Mtn. (Art Detmar). The species is not native, although it is known to breed temporarily in Colorado on cultivated *Aristolochia* (Brown et al. 1957).

Pieridae

Anthocaris sara Lucas. 5 loc: along both sides of the Sangre de Cristo Mts. (Hayden Creek Campground, near Poncha Pass, W. of Hayden Pass) and the mountains west of the San Luis Valley, probable in Wet Mts., 8000-10500', in semi-forested valley bottoms. One brood, late May-late June. Uncommon, sometimes common. Larval hosts many Cruciferae. Adults of *Anthocaris*, *Euchloe*, and *Pieris* often feed on flowers of all colors, most often yellow and white ones, especially Cruciferae.

Euchloe ausonia coloradensis (H. Edw.). 33 loc: throughout the mountains and plains-foothills ecotone from 6150-10300', in open areas. One brood, mid April-June 12 in Wet Mtn. foothills, late May-early July at higher altitudes (as late as July 30 at the highest altitude). A partial second brood in early July occurred once in Jefferson County. Common. Larval hosts many Cruciferae (Scott 1974c). *E. ausonides* is a subspecies of *E. ausonia* (Higgins & Riley 1970).

E. olympia (Edw.). 17 loc: plains (Pueblo, etc.), Wet Mtn. foothills, Arkansas Canyon (Royal Gorge and Cotopaxi), probable Huerfano Park, 4800-6800', in open areas. One brood April 9-May 21. Uncommon, sometimes common. Larval hosts Cruciferae.

Pieris napi macdunnoughii Rem. 32 loc: throughout the mountains from 6700-11000', especially above 8000', in moist areas along

streams. One brood, late June-early Aug. (extremes May 29-Aug. 12). Uncommon to common. Larval hosts many cruciferae.

P. rapae (Linn.). 26 loc: plains, Wet Mtn. foothills, Arkansas River Canyon near the river, San Luis Valley floor, and three records from the Sangre de Cristo Mts. (Hermit Pass road 9000', Medano Creek, and west of Hayden Pass 8800'), from 4300-9000', in towns and in natural riparian habitats. Multiple broods on the plains, flying continuously from early April to early Oct. Two or three broods in the Arkansas Canyon, late May to mid June, early July-early Sept. July 15-Aug. 14 in San Luis Valley (a first brood may occur there). Common in cities, usually uncommon in native habitats. Larval hosts many Cruciferae, rarely on Capparidaceae.

P. sisymbrii elivata (B. & B.). 24 loc: Wet Mtn. foothills, extending out onto the plains as far as 2 mi. NE Crow and 2 mi. E. Penrose, the Arkansas Canyon, San Luis Valley (Villa Grove), hills in Huerfano Park, and reported in Wet Mountain valley in "W. Custer County" (Cockerell in Nash, 1893), and 11 mi. NE Silver Cliff (Brown et al. 1957), from 5200-8600' in fairly open habitats. One brood, April 7-late May, seldom to mid June. Usually uncommon. Larval hostplants Cruciferae.

P. chloridice beckerii Edw. 25 loc: plains, Arkansas Canyon, Huerfano Park floor, and San Luis Valley floor, 4860-8200', mostly in arid eroded habitats. About 4 broods on the plains, with the last broods coalesced: April 9-May 2, June 3-22, July 5-October. In the Arkansas Canyon there are probably three broods, of which the second is June 15-July 10 and the third is Aug. 15-Sept. 10. Sometimes common on the plains, uncommon elsewhere. Larval hosts many Cruciferae including *Stanleya pinnata* (two ovipositions west of Pueblo) and Capparidaceae (a genus not in Colorado). *P. beckerii* is a subspecies of *chloridice* (Higgins & Riley 1970).

P. protodice Bois & LeConte. 55 loc: throughout the area 4300-12349', mainly in open areas. There are perhaps four broods on the plains with the first brood (*vernalis*) from early April to mid May, many records from late May through September, and *vernalis* again in late Sept.-Oct. In the mountains there are perhaps three broods from April to September. It probably does not breed much above 9000' and the few individuals above this apparently arrive from lower altitudes. Larval host Cruciferae including *Sisymbrium altissimum* (oviposition at Howard), *Thelypodium elegans* (oviposition at Box Canyon),

Descurainia sophia (oviposition at Bear Creek, Fremont County), *D. pinnata* (oviposition at Crow, Pueblo Co.), *Thlaspi arvense* (oviposition at Coaldale) and on Capparidaceae including *Cleome serrulata*.

P. callidice occidentalis Reak. 18 loc: throughout the mountains, and one record on the plains (Low Back Creek SE of Florence), only one record Wet Mtn. foothills (Hardscrabble Can.), few records Arkansas Canyon (Monarch, Salida, Coaldale), from 5600-13800' (only two records below 7000', usually above 8000'). There is apparently only one brood in the foothills, April 9-late May (form *calyce*), one and sometimes a partial second brood at higher altitudes, mid June-mid Aug. (extremes May 29-Sept. 10, the last date *calyce*). The form *calyce* occurs during summer mainly above timberline (one record below 10700') along with typical individuals which may fly up from lower altitude. Uncommon, sometimes common above timberline. Larval hosts many Cruciferae, occasionally Capparidaceae. *P. occidentalis* is a subspecies of *P. callidice* (Brown et al. 1957, Higgins & Riley 1970).

Neophasia menapia (F. and F.). 19 loc: throughout the mountains, 6300-8800', in pine forests. One brood July 16-Sept. 2. Uncommon to common. Larval foodplants conifers including *Pinus*, *Pseudotsuga menziesii*, *Abies*. *P. ponderosa* and *P. edulis* prevail where the species occurs in this area. Adults feed on many flowers such as *Cleome*, *Rudbeckia*, *Solidago*, especially during cloudy periods when they come down from the trees.

Colias cesonia (Stoll). Strays have been caught at 15 localities throughout the area except the San Luis Valley, from 4300-10000', usually flying rapidly along valley bottoms, from May 10-Aug. 12 (representing several broods farther south). The species was fairly common and fresh in Hardscrabble Canyon in July 1973, suggesting temporary local breeding. Larval hosts are legumes. *Colias* adults feed on many flowers of all colors, perhaps most often on bluish or reddish blue ones, and on mud where they may congregate.

C. meadii Edw. 18 loc: Wet Mts. (Greenhorn Peak to Ophir Creek), Sangre de Cristo Mts., and the Cochetopa Hills west of the San Luis Valley, from 10000-13600', in meadows and tundra, from July 12-Aug. 25 (extremes June 23-Sept. 3). Common, sometimes abundant. Larval hosts are legumes, including *Trifolium dasyphyllum* (ovipositions seen at Hermit Pass, Baldy and Greenhorn Peaks).

C. eurytheme Bois. and *philodice* Godart. 55 loc. (*eurytheme*) and 66

loc. (*philodice*): throughout the area from 4300-12500' (more frequent below 9000') in open hillsides, meadows and agricultural legume fields, etc. Perhaps four broods on the plains and foothills from mid April through October, perhaps two or three broods in the mountains from late May to early September. *C. philodice* is commoner than *eurytheme* throughout the area, and is sometimes abundant in alfalfa fields and meadows with *Trifolium*. In 42 of 80 loc. both species are known; there appears to be no ecological or temporal separation of these two entities in this area, and phenotypic intermediates sometimes occur more frequently than the low *eurytheme* frequency. Larval hosts are many legumes: for *eurytheme*, including *Trifolium nanum* (oviposition at Hermit Pass), *Medicago lupulina* (oviposition at Five Points Recreation Area, Fremont Co.), *Mellilotus officinalis* (oviposition at Beulah); for *philodice*, including *Astragalus* spp. (ovipositions NE of Rosita and in Saguache Park), *Trifolium* sp. (oviposition Ophir Creek, Custer Co.), *Oxytropis* sp. (oviposition Saguache Park).

C. alexandra Edw. 44 loc: throughout the mountains (a two-brooded plains ecotype found southeast of Denver does not occur here) from 6800-10300', usually in open grassy areas. One brood late June-mid Aug. (extremes June 14-Aug. 26), slightly earlier (mid June-mid July) in the foothills. Common. Larval hosts legumes including *Astragalus* (H. W. Nash observed oviposition at Rosita).

C. scudderii Reak. 3 loc: Wet Mts. and Sangre de Cristo Mts. (near Micawber Mine, western Custer Co., Cockerell 1890a), from 10300-11000', in willow bogs. One brood mid July-mid Aug. (extremes June 27-Aug. 25). Uncommon to common. Larval hosts are bog *Salix*.

Nathalis iole Bois. 49 loc: throughout the area (but only two loc. in SanLuis Valley) 4300-13000' (usually below 9000', more common at low altitudes) in open areas often flying along valley bottoms. Several broods, mid June-early October (extremes May 25-Oct. 22) plains, June 14-Aug. 10 Arkansas Canyon, July 4-Aug. 25 in Wet Mtn. Valley. Usually uncommon, but is common in some years, especially in late summer; the data strongly suggest that the species is very mobile, probably migratory. Larval hosts include many Compositae: *Bidens*, *Helenium*, *Thelesperma*, *Dyssodia* "*papposa*" (Nash, 1893), *Boebera*; Caryophyllaceae: *Stellaria media*; Geraniaceae: *Erodium* (dubious); Rubiaceae: *Galium* (Forbes 1960; dubious). Adults feed on various low flowers, often yellow ones.

Eurema nicippe (Cram.) 17 loc: throughout the area (4300-12500'), often flying along valley bottoms, from June 4-Aug. 6, one record Sept. 10. Rare, a migrant from farther south. Larval hosts are legumes. It may occasionally breed here; several individuals were seen at one locale, and a colony existed at another locale.

E. mexicana (Bois.) 9 loc: throughout the area except for the San Luis Valley and Huerfano Park, 6000-12000', May 30-Sept. 6 (mostly June 11-Aug. 2). Rare, a migrant from farther south, although it may temporarily breed in Colorado, because several individuals were seen at each of several localities. The specific legumes that are known as larval foodplants do not occur in Colorado.

E. nise (Cram.) We caught a stray female of this Texas species on the upper plains north of Goodpasture, Aug. 1.

Phoebis sennae (Linn.) ssp. 3 loc: Arkansas Canyon and Wet Mtn. Valley (Rosita, Cockerell 1927), 7000-9000', June 26 to July 24, represent strays from farther south. Larvae feed on legumes.

P. philea (Johansson). One stray was found in the San Luis Valley (Brown et al. 1957).

Kricogonia lyside, (Godart). One specimen in foothills (Phantom Canyon, Aug. 16, Maurice Howard) was a stray from farther south.

Nymphalidae

Danaus plexippus (Linn.) 27 loc: throughout the area from 4300-11500' (rare above 9000'), mainly in lowlands near the larval foodplants. There are scattered records from April 30-June 9, and Sept.-Oct., but most records are from June 26-Aug. 26. This migratory species can be common locally. Larval hosts many *Asclepias* and rarely Apocynaceae. Adults feed on *Asclepias* and other flowers of various (usually bluish or reddish blue) colors.

D. gilippus strigosus (Bates). 11 loc: throughout the area (probable in Huerfano Park) from 4300-9200', from June 14-Sept. 22 (it has multiple broods farther south where these strays originate). A rare migrant. Larval hosts Asclepiadaceae.

Agraulis vanillae incarnata (Riley). 4 loc: plains, Arkansas Canyon, and Wet Mtn. Valley from 4300-9000', mostly flying in valley bottoms, from May 24-Aug. 6. A rare migrant. Larval hosts (*Passiflora*) are not native to Colorado.

Anaea andria Scud. 9 loc: plains west to Canon City and the mouth of Phantom Canyon, from 4300-6200', mainly in Cottonwood-willow

Anaea andria Scud. 9 loc: plains west to Canon City and the mouth of Phantom Canyon, from 4300-6200', mainly in Cottonwood-willow groves along streams. Two broods: June 29-Aug. 17, then Sept. 13-April 14 (apparently overwintering). Uncommon. Larvae feed on *Croton texensis* (Euphorbiaceae) (oviposition in Baca County, many leaf-rolling larvae from near Canon City raised to adults). Adults never feed on flowers, but often on willow and popular sap, sometimes on mud.

Asterocampa celtis (Bois. & LeConte) ssp. 7 loc: lower foothills (Oak Creek) and plains, 4300-6800', on or near the larval host which grows in valley bottoms. Apparently two broods, June 17-July 24, Aug. 3-Sept. 15 (extremes June 13-Oct. 25, peaks in late June and Late Aug.). sometimes common in Denver, Colorado. Larvae feed on *Celtis reticulata* (Ulmaceae; many ovipositions on twigs and leaves near Rockvale). *Ulmus parvifolid* was suspected as a foodplant at Denver, but first instar larvae would not eat the leaves. Adults rarely feed on flowers (*Jamesia*, etc.) but often feed on sap especially of willows occasionally feed on mud or on *Rubus* berries.

Limenitis bredowii eulalia (Dbdy). One stray female from farther south was found in the foothills north of Goodpasture, Aug. 1. Larvae feed on oaks, which are abundant in the vicinity.

L. archippus archippus (Cram.) 12 loc: plains (west to Canon City) and all over the floor of the San Luis Valley (strangely absent in Arkansas Canyon), probably in Huerfano Park, 4300-7750'. Individuals fly beside the foodplant along streams and ditches. Two broods on the plains, May 19-July 5, July 24-Sept. 7 (extreme Oct. 7); perhaps only one brood in San Luis Valley, June 13 (south of this area) and July 19-Aug. 9. Uncommon, sometimes common. Larvae feed on Salicaceae, including *Salix exigua* which is certainly the main or only food in this area. Adult *Limenitis* feed on many flowers of all colors (often bluish or reddish blue), occasionally on sap.

L. weidemeyerii Edw. 57 loc: throughout the mountains, and the plains east to Pueblo, 4860-10500' (rare above 9000'), mostly in valley or gulch bottoms. Perhaps two broods (or one long brood) on the plains and Arkansas Canyon, June 8-Sept. 2, one brood in the Wet Mountain and San Luis Valleys, June 24-Aug. 9. Fairly common. Larval hosts Salicaceae; including *Salix*, *Populus tremuloides*; Rosaceae: *Ame-lanchier alnifolia*, *Holodiscus*.

Precis coenia (Hubn.) 6 loc: plains, Wet Mtn. foothills (Beulah, Nash 1893), and Wet Mtn. Valley (Rosita, Nash, 1893), 4300-9000', usually

near *Plantago* along streams. It is a rare stray here, but may breed temporarily such as in 1971 when 6 individuals were caught. Larval foodplants are various Plantaginaceae, Scrophulariaceae, and Verbenaceae (*Lippia*) (Scott 1975c). Adults feed on flowers of many colors and on mud.

Polygonia interrogationis (Fab.) 3 loc: plains (Pueblo, Canon City) and Wet Mtn. foothills (Hardscrabble Canyon), probable in Huerfano Park, 4300-5400', along streams and in poplar groves, and in suburbs. There are probably two broods, the first June 10-July 6, the second (or part of the first) from July 19-mid Aug., the third (or second) from late Aug. hibernating to the next April-May. Rare-uncommon. Larvae feed on three closely related families — Urticaceae: *Urtica*; Ulmaceae: *Ulmus parvifolia* (many larvae raised at Pueblo by M. Howard), *Celtis*; Moraceae: *Humulus*. *Polygonia* adults often feed on sap, sometimes on *Rubus* berries, sometimes on flowers, especially yellow ones, occasionally on mud.

P. satyrus (Edw.) 21 loc: throughout the area between 5100-8000', on the plains to east of Florence (a sight record eastward in Baca County) along streams and in poplar groves. Records occur continuously all year, but there are apparently two broods, the first June 24-Aug. 3 (rarely Aug. 27), the second September overwintering to early June. Uncommon. Larval hosts Urticaceae: *Urtica gracilis*; Ulmaceae: perhaps on elm (no documentation exists); Moraceae: *Humulus lupulus*.

P. zephyrus (Edw.) 64 loc: throughout the mountains including hills just east of the mountains, and hills in the San Luis Valley and Wet Mtn. Valley floors, 5800-13000' (usually below 10000') in gullies and valley bottoms. Two broods, the first from June 17-Aug. 4, the second Aug. 25 overwintering to late May (some adults may be found throughout the year). Perhaps only one brood near timberline, July 6-Aug. 16 then perhaps overwintering. Common. Larval hosts *Ribes* (Saxifragaceae).

P. faunus hylas (Edw.) 19 loc: all three mountain ranges (probable in Huerfano Park) from 6800-11000' (usually 8000-10000'), along streams. One brood, from Aug. 10-overwintering to late May (extremes Aug. 2 to July 3). Uncommon around the San Luis Valley, sometimes common elsewhere, rarely very abundant on yellow flowers in August (individuals apparently do not mate until spring). Larval foodplants Salicaceae (*Salix*) in Colorado. Other recorded hosts are *Rhododendron*; Corylaceae: *Betula*, *Alnus*, which are possibly correct,

and *Ribes* which seems dubious or confused with other *Polygonia*.

Nymphalis antiopa (Linn.) 45 loc.: throughout the area 4300-11000', in riparian habitats. Two broods, June 24-mid Aug., late Aug. overwintering to late May (some individuals occur all year). Common. Larval hosts Salicaceae: *Salix* including *S. exigua* (larvae from Lake Creek Campground, Custer Co., and Mirage, Saguache Co., reared to adults), *Populus*; Ulmaceae: *Ulmus*, occasionally *Celtis reticulata*; Moraceae: *Humulus lupulus*; other recorded hosts are *Betula*, and, doubtfully, *Rosa* and *Pyrus communis* (pear). Adult *Nymphalis* occasionally feed on flowers of all colors (often yellow), but more often feed on willow and cottonwood sap, rotting fruit, and occasionally on mud.

N. milberti (Godart) ssp. 50 loc: throughout the area (infrequent on the plains where it extends east to Pueblo), 4860-13800', frequent and widespread above timberline, often near *Urtica* or on hilltops at low elevations. Its presence above timberline (*Urtica* does not grow there) is puzzling and may involve its dispersal. Two broods, June 21-mid Aug., late Aug. overwintering to late May (some individuals may be found all year). Perhaps one overwintering brood above 10000' (records June 15-Aug. 25). Uncommon, sometimes common above timberline or around *Urtica*. Larval hosts *Urtica dioica gracilis* (larvae from Texas Creek and Hillside raised to adults); Ulmaceae: *Ulmus* occasionally. Adults often feed on flowers, especially yellow ones.

N. californica (Bois.) 12 loc: over the Wet Mts., and the east side of the Sangre de Cristo Mts. (North Taylor Creek). Probable throughout the mountains (present farther south along the Rio Grande River), from 6800-10700' (once 12349'), on hilltops and valley bottoms. Two broods, June 29-early Aug., Sept.-late May. Rare to uncommon. Larvae feed on *Ceanothus*.

Vanessa cardui (Linn.) 60 loc: throughout the area, 4300-13000'. Individuals migrate north to the area in April-May, breed several generations (records occur throughout the summer but are most frequent in late June and in late July-early August), then fly south in Sept.-Oct. Records occur every year from 1965 to 1973 except for 1967. An immense northward flight occurred May 1973 and a small return flight was noted in Sept.-Oct. 1973 in the lowlands (and July 1973 at high altitude). Larval hosts many plant families, but usually Compositae, including *Cirsium vulgare* (larvae raised to adults from near Salida), *Artemisia frigida*, *Anaphalis margaritacea* (many ovipositions elsewhere in Colorado for these two plants). *Vanessa* adults

feed on various flowers of all colors, sometimes on sap (*atalanta*), or on mud.

V. atalanta (linn.) 36 loc: throughout the area, 4860-9800' (one record 11000'), on ridgetops and valley bottoms. Apparently two broods, the first from late June to early Aug., the second late Aug. overwintering to late May. Usually uncommon, but fairly common in 1973. Larval hosts Urticaceae, Moraceae, Ulmaceae.

V. carye annabella (Field). 9 loc: throughout the area including Pueblo and high altitude on both mountain ranges (probable Wet Mtn. Valley), 4860-13800'. Several broods, Aug. 6-Oct. 1 overwintering to late May at lower altitudes (perhaps a mid-summer brood has been missed), early July-Oct. 14 overwintering to mid June at higher altitudes. Rare. Larval hosts many Malvaceae; occasionally Urticaceae. We treat *V. annabella* as an allopatric North American subspecies of *carye*.

V. virginensis (Drury) 18 loc: throughout the area (probable at high altitude in the Wet Mts.), 4300-13000'. There are apparently two broods at mid and higher altitudes, from late June to early Aug., and Aug. 23, Oct. 12, May 5 (apparently overwintering?). On the plains and foothills, records are June 12-28, July 12, and July 25-Aug. 14, perhaps indicating three broods (with an overwintering brood unsampled). Uncommon. Larval hosts Compositae; rarely Boraginaceae.

Euptoieta claudia (Cram.) 44 loc: throughout the area, 4300-12500' (a rare stray above 9000', up to 12000' on Greenhorn and Galena Peaks), usually in prairie habitats. Several broods mid May-Oct, with peaks in late May, mid June-early July, and late July on the plains, with few records after Aug. 3. Adults may migrate from lower altitudes and latitudes to higher ones. Common, especially at lower altitude and in certain years. Larval hosts Violaceae: *Viola*, sometimes *Linum*, *Sedum*, supposedly others. Adults often feed on flowers.

Speyeria aphrodite ethne Hemming. 54 loc: throughout the mountains and on the plains a few miles east of the foothills (one record 10 mi. W. Pueblo), 5200-9500' (rarely 10300'), in chaparral or open forests. One brood, June 24-Sept. 2 (extremes June 12-Sept. 13) main peak late June-late July). Adult females of some *Speyeria* seem to diapause; after diapause they may lay eggs in late summer. Diapause is most pronounced in *S. aphrodite*, *edwardsii*, and *coronis*, which have a very long flight perio. and females predominate at the end, although

males of all three species occur as late as Aug. 24. In fact, there is a second peak of records in late August in all five local *Speyeria*. Also, dispersal seems to be greatest in the first three *Speyeria* listed and *S. mormonia* in late summer, when females are found on the plains, after diapause terminates. The two species with little or no diapause, *S. mormonia* and *atlantis*, occur in moister habitats. *S. aphrodite* is common. Larvae of all *Speyeria* feed on *Viola*. Adult *Speyeria* feed on flowers of many colors, and on mud.

S. edwardsii (Reak.) 32 loc: throughout the mountains and the plains a few miles east of the mountains (one record 11 mi. SSW Pueblo), 5200-12349' (usually 6000-9500'), mainly in shrubland or openings in forests. One brood, late June-Sept. 2 (extremes May 25-Sept. 13) (main peak late June). Common but less so than *S. aphrodite*.

S. coronis halcyone (Edw.) 33 loc: throughout the mountains (probable in Huerfano Park) and the plains a few miles east of the mountains (4 mi. E. of Canon City etc.), 6000-9500', mainly in open areas and chaparral. One brood, late June-Sept. 2 (extremes May 25-Sept. 13, main peak late June). Abundance similar to *S. edwardsii*.

S. atlantis hesperis (Edw.) 38 loc: throughout the mountains from 6600-10700', along streams, or in wet meadows (including the Arkansas Canyon bottom and Wet Mountain Valley bottom). One brood mid July-late Aug. (extremes June 21-Sept. 10, main peak late July). Common. In the Wet Mtn. foothills the unsilvered form ("*hesperis*") greatly predominates and occurs in drier habitats such as *Quercus* groves. Silvered forms ("*electa*" Edw.) are the majority in the rest of the area, especially in wet meadows. Along Medano Creek in the Sangre de Cristo mts., a wide variety of silvered and unsilvered forms occurs including very pale individuals approximating the pallid subspecies which occurs on Raton Mesa in New Mexico.

S. mormonia eurynome (Ewd.) 19 loc: Wet and Sangre de Cristo Mts., and mountains west of the San Luis Valley, from about 9800-13000', straying to lower altitudes late in the flight period to the San Luis Valley, Wet Mtn. Valley, Wet Mtn. foothills (7200'), and even to the plains near Denver. The usual habitat is subalpine meadows. One brood, late July-late Aug. (extremes July 13-Sept. 2). Common to abundant.

Boloria selene tollandensis (B. & B.) 4 loc: Wet Mtn. Valley floor, and in the San Luis Valley (west of Villa Grove), from 7600-8400', in wet meadows. On the plains north of this area several colonies of a subspecies with reddish brown VHW base occur; the plains here are

too dry for the species. Apparently two broods in Wet Mtn. Valley, mid June-July 1, July 24-Sept. 7. In the plains subspecies peaks occur in early June, July, and late Aug.-early Sept. Populations at about 10,000' in the state are apparently only single brooded in late July. Common but very local. Larval foodplant *Viola* sp. (oviposition next to plants on drier mounds of a meadow near Westcliffe). Adult *Boloria* feed on flowers on various, often yellow, colors.

B. titania helena (Edw.) 10 loc: throughout the Sangre de Cristo Mts. (and Mt. Blanca) and Cochetopa Hills, absent from the Wet Mts., 10000-13000', in moist spots at the edge of bogs, and in swales above timberline. It is almost exclusively alpine in the Sangre de Cristo Mts. One brood, July 17-Aug. 5 (extremes June 29-Aug. 14). Common. Adults are associated with dwarf alpine *Salix*, which seems to be a larval food elsewhere, in Alberta (Ferguson 1954).

B. freija browni Higgins. 2 loc: upper Wet Mts. (north of Greenhorn Peak) and in the Cochetopa Hills (near Cochetopa Pass, also Marshall Pass), probable in the Sangre de Cristo Mts., from 10000-10500' (9500-12000' elsewhere in Colorado). It occurs in valley bottoms and at the edge of bogs where *Vaccinium* occurs. One brood, in June (extremes May 25-July 6). Common but very local. Larval foodplant *Vaccinium caespitosum* in Colorado. Adults feed on flowers (*Pulsatilla*, etc.) and mud.

Poladryas minuta arachne (Edw.) 64 loc: throughout the mountains in hilly areas, 6000-10500' (usually 6500-9300'). Adults occur almost continuously from May 28 to Sept. 6. Records are most frequent in late June, mid to late July, mid and late Aug. Because developmental period from egg to adult is about 7 weeks at 20°C, this may represent two broods for some individuals, fewer for others. Common. Larvae feed on *Penstemon* (Scott 1974b). Adults feed on flowers of all colors, mainly yellow ones.

Euphydryas chalcedona (= *anicia*). 22 loc: Wet Mts. from 6200-12349' (uncommon in the foothills, at Greenhorn and at Beulah), in the Sangre de Cristo Mts. from 9700-13800', and hills west of the San Luis Valley (Bonanza, 9600'; Nash 1893). *E. c. brucei* (Edw.) occurs above 11000' in both the Wet and Sangre de Cristo Mts., usually on tundra ridges. At middle elevations in the Wet Mts. (and Mosca Pass in Sangre de Cristo Mts.) an extremely variable population occurs (some individuals resemble subspecies *eurytion* (Mead), *capella* (Barnes) and *carmentis* (B. & B.) usually the former) in open grassland. Foothills specimens (not seen) may be *capella*. One brood, June-early July in

foothills, June 30-Aug. 2 (extreme Aug. 16) at higher altitudes. Rare at low altitudes, common to abundant above 9000'. Larvae feed on various Scrophulariaceae including *Castilleja integra* (larvae raised to adults near Rosita). Adults feed on various flowers, often yellow or white ones. I have series from the Sierra Nevada of California and from Washoe County, Nevada in which individuals intergrade in genitalia and wing pattern between *chalcedona* and *anicia*, hence I provisionally unite these subspecies.

Chlosyne leanira fulvia (Edw.) 2 loc: plains, Wet Mtn. foothills, Arkansas Canyon (Box Canyon, Fleming Mtn.), and the Wet Mts. from Rosita to Greenhorn Peak, probable in Huerfano Park. The larval foodplant is locally abundant in the San Luis Valley but the insect apparently does not occur this far north in the Rio Grande drainage. 5000'-9300', once (a stray? male) 12349'. It is fairly widespread on the plains, usually on limestone ridges. It occurs at a gypsum quarry in the Arkansas Canyon. In the higher Wet Mts. it occurs on grassland ridges and hilltops near the larval host. The larval host, and therefore the butterfly, is highly restricted to calcareous soil. Three broods on the plains, May 3-June 5, June 26-July 26, Aug. 13-Sept. 6. One brood in the higher Wet Mts., July 6-26. Uncommon at higher altitudes, may be common or abundant on the plains. Larvae feed on *Castilleja integra* (Scott 1968; females lay egg clusters on lower leaves; larvae raised from Pueblo, Beulah, Wetmore). Adult *Chlosyne* feed on various flowers, often yellow ones, and on mud. Intergradation of adults and lack of major foodplant or larval differences suggest conspecificity of *leanira*, *alma*, and *fulvia*.

C. damoetas (Skin.) 6 loc: Sangre de Cristo Mts., 11400-13000', flying over rockslides near the larval host. One brood, July 9-Aug. 11. Fairly common but very local near the larval host, *Erigeron leiomeris* (a cluster of 63 eggs laid on leaf and adjacent rock at Hermit Pass). Adults feed on blue *E. leiomeris* and other flowers. Adults are slightly darker here than elsewhere in Colorado.

C. acastus (Edw.) 8 loc: Arkansas Canyon from near Nathrop to Wellsville (it may extend farther down the canyon) and around the San Luis Valley (Mosca to Rito Alto Creeks), possible in Huerfano Park. 7000-8500', mostly in gulch bottoms where *Chrysothamnus* is abundant. One brood, May 27-June 25. Uncommon. Larval hosts Compositae: *Chrysothamnus*, *Aster*. Adults have slightly heavier black markings than specimens from Utah.

C. gorgone (Hubn.) 28 loc: all over the plains, Wet Mtn. foothills, Arkansas Canyon, and Wet Mtn. Valley (south to Bull Domingo Hills). Probable in Huerfano Park, apparently absent in the San Luis Valley. 4300-8100', in chaparral, flats, etc. near larval hosts. About three broods on the plains, April 24-early June, late June-end of July, Aug. 8-Sept. 5. One brood elsewhere, mid May-early July (extremes May 5-July 14); larvae from these areas diapause half grown. Common. Larval hosts Compositae including *Helianthus pumilus* (larvae from Iron Dollar Gulch and Fleming Mtn., Fremont Co., raised to adults), *H. petiolaris* (larvae found in Hardscrabble Canyon), *H. annuus* (reared at Pueblo by Maurice Howard). Adults are associated only with *H. pumilus* at higher altitudes.

C. nycteis drusius (Edw.) 7 loc: plains (Pueblo, SE of Beulah), Wet Mtn. foothills (Rye to Hardscrabble Canyon) and northern Wet Mtn. Valley, possibly in San Luis Valley, 4800-7500', along streams. One brood, June 4-30 in the foothills (uncommon), late June-July 13 Wet Mtn. Valley (common). Larval host *Rudbeckia laciniata*; in Colorado it is always associated with *R. laciniata* along streams.

Phyciodes picta Edw. 16 loc: plains west to the mountains, and all along the Arkansas Canyon, probable in Huerfano Park, 4300-7100', on flat alkaline areas where *Convolvulus* is common especially along road and railroad tracks. About three broods, about May 11-mid June, early to late July, early Aug.-Sept. 8 (some individuals can be found all summer). Common. Larval hosts various *Aster* spp. (W. H. Edwards raised eggs obtained by Nash at Pueblo) and *C. arvensis*. Adult *Phyciodes* often feed on flowers, often yellow and white ones, and on mud.

P. campestris camillus Edw. 65 loc: throughout the area (including the Wet Mtn. and San Luis Valley floors and the plains east at least to Pueblo and farther east in Prowers County), 4800-9500' (rarely up to 10700'), more often in valley bottoms than elsewhere. Apparently four broods on the plains, May 4-June 8, June 13-early July, July 22-Aug. 12, Aug. 28-Sept. 13. Three broods elsewhere, end of May-start of July, mid July-early Aug., late Aug.-mid Sept. Common. Larval hosts *Aster*, including *A. ericoides* with which it is associated east of Colorado Springs. Edwards (1868-1897) raised larvae obtained from Nash at Pueblo on many *Aster* spp.

P. tharos (Drury) 45 loc: throughout the area (probable in Huerfano Park), 4300-9000', in moist valley bottoms, streamsides, and moist

meadows. Apparently three broods on plains, early or mid May-early June, late June-early Aug., late Aug.-mid Sept. Mainly one brood Wet Mtn. foothills (May 25-Aug. 12, but most records late June-mid July). One brood in the Arkansas Canyon and higher altitudes, June 25-early Aug. Common. Larval hosts Compositae: *Aster*, *Verbesina*.

P. vesta (Edw.) Nash (1893) found strays of this Texas species at Doyle Ranch (SE of Pueblo), Hardscrabble Canyon, and Rosita. The larval foodplants (Acanthaceae) of *P. vesta* and *P. texana* are not native to Colorado.

P. texana (Edw.) One stray was caught near Coaldale in the Arkansas Canyon by Kathy Scott, June 27.

Cyllopsis pertepida dorothea (Nabokov). 34 loc: Wet Mtn. foothills, Arkansas Canyon as far upstream as Buena Vista, hills in Wet Mtn. Valley south to Bull Domingo Hills, Huerfano Park, and hills in San Luis Valley north to west of Villa Grove, 5800-9000', in gulches in the pinon-juniper or ponderosa pine belt. One brood, June 20-July 10 (rarely worn females to Sept. 2) in foothills, mainly mid July-mid Aug. elsewhere (range June 17-Sept. 10). Usually uncommon, sometimes common but very hard to catch in the underbrush and steep gulches. Larval hosts probably grasses. Adults almost never feed; one male fed at mud.

Coenonympha tullia ochracea Edw. 52 loc: throughout the area except the plains and San Luis Valley floor, 6300-10500', in grassland chaparral, open forests, etc. One brood May 21-July 6 in Wet Mtn. foothills, May 27-late July (peak late June) elsewhere. Common. Larvae feed on various grasses in the laboratory, and on sedges in Europe. Adults often feed on flowers, especially yellowish or whitish ones.

Cercyonis pegala boopis (Behr) 45 loc: plains, Wet Mtn. foothills, Arkansas Canyon, Wet Mtn. Valley south to Lake Creek, probable in Huerfano Park but absent in San Luis Valley, 4300-8100', often in valley bottoms, frequent in cottonwood groves on the plains. One brood, June 27-mid Aug. in the plains and foothills (peak late July, females as late as Sept. 13), July 1-late Aug. (peak end of July, extreme Sept. 10) in the Arkansas Canyon. Common. Larvae feed on various grasses. Occasional females have slightly yellowish patches on the dorsal forewing, especially on the plains. Adults feed on willow and poplar sap and often on flowers (especially bluish ones) including *Tamarix*, *Solidago*, *Medicago*, *Cirsium*, and on mud.

Neominois ridingsii (Edw.) 34 loc: throughout the area, except only one record in Wet Mtn. foothills (NE of Oak Creek Camp) and only one record on plains (east of Greenhorn just east of the foothills), although it extends east of the Front Range to Cheyenne County. 6100-13000' (usually below 10000', but occurs above this at Hayden, Hermit (two dates, 13000'), and Music Passes). It occurs in grassland, sometimes in pinyon-juniper woodland. One brood, early June-July 4 on the plains, mid-June-late July elsewhere (extremes June 9-Aug. 16) (peak late June near Salida, early July in San Luis Valley). Common. Larvae feed on grasses in the lab (Edwards, 1868-1897), oviposit on *Bouteloua gracilis* and other plants (Bear Creek, Chaffee Co.; Scott 1973a). Adults rarely feed, on various (mainly yellow) flowers.

Oeneis chryxus (Dbdy.) 28 loc: Wet Mts. (only two records in the foothills at Beulah and between North Creek and South Hardscrabble Creek, but widespread from 9000-12349' west to Rosita and Devil's Hole in Huerfano Park) and Sangre de Cristo Mts. (above 9000' on the east side, above 8500' on the west side), and the hills on the west side of the San Luis Valley (southwest of Villa Grove, Bonanza). Mostly in grassy areas especially on ridges, 7000-13000', most widespread above timberline, local below. One brood, May 25-July 28 below 10000' (peak late June), July 1-31 above. Uncommon to common. Larvae undoubtedly feed on unknown monocotyledons. Adult *Oeneis* seldom feed; *O. chryxus* was observed feeding on a yellow composite and on mud. This species probably has a two year life cycle because we

C. oetus charon (Edw.) 57 loc: throughout the area except for the plains and the floor of the San Luis Valley, 6300-10300', in grassland, chaparral, or open forest. One brood, June 28-Aug. 2 (peak mid July) in the foothills, July 9-Sept. 10 (peak late July) elsewhere. Common. Larvae from Rosita and Salida were raised on grasses by W. H. Edwards (1868-1897). Adults feed on many flowers of al

C. meadii alamosa Emmel & Emmel. 14 loc: San Luis Valley, on the valley floor and hills at the edge (*C. oetus* occurs at the edge and at higher elevations in the San Luis Valley), 7500-8600', in grassland, chaparral, or open woodland. It is common in El Paso County even on the plains 10 mi. east of Colorado Springs, southwest to Phantom Canyon, but is absent in our area except for the San Luis Valley. One brood, July 18-Aug. 22 (peak early Aug.). Common. Larval foodplants are grasses; it is often associated with *Bouteloua gracilis*. Adults feed on flowers of various colors. Adults have a slightly more pronounced ventral hind-wing band here than northward.

have 36 records during even-numbered years but only 3 records for odd-numbered years.

O. alberta oslari Skin. 3 loc: north side of the Arkansas Canyon (Echo Canyon, 8700'), the Cochetopa Hills west of the San Luis Valley (10000-10500'); also south of the area on Raton Mesa (9000'). Many promising habitats in the Wet and Sangre de Cristo Mts. were searched without success. One brood, mid May-early June (range May 3-June 24), in bunch-grassland. Usually common but very local. Larvae feed on monocotyledons, reportedly on *Festuca*. Adults from Cochetopa Hills are grayer than those elsewhere. Many adults fed on mud by landing on the downwind side of a pond then flapping and crawling toward the mud.

O. uhleri (Reak). 13 loc: Wet Mts. (Rosita (Nash), north and NW of Greenhorn Peak), Sangre de Cristo Mts. (only in the Rio Grande side except on Poncha and La Veta Passes) and the Cochetopa Hills, 8900-10500', in bunch-grass habitats. One brood, early June-early July (range May 27-July 17). Common but local. Larvae probably feed on bunch grasses. Adults feed on mud and rarely on flowers.

O. melissa lucilla B. & McD. 4 loc: Sangre de Cristo Mts. (so far only south of Hayden Pass southward to Mt. Blanca). 12000-13800', on alpine ridges. One brood, July 2-Aug. 1. Often common. Larvae feed on monocotyledons, including *Carex*.

Erebia magdalena Strecker 8 loc: Sangre de Cristo Mts. on Mt. Blanca and north and south of Hayden Pass, 11600-13800', flying over rockslides. One brood, July 3-Aug. 5. Uncommon, occasionally common. Larvae undoubtedly feed on monocotyledons, including *Carex* (oviposition observed by J. Emmel, pers. comm.), and eat *Poa pratensis* in the lab (reared by Michael Young).

O. alberta oslari Skin. 3 loc: north side of the Arkansas Canyon (Echo Canon, 8700'), the Cochetopa Hills west of the San Luis Valley (10000-10500'); also south of the area on Raton Mesa (9000'). Many promising habitats in the Wet and Sangre de Cristo Mts. were searched without success. One brood, mid May-early June (range May 3-June 24), in bunch-grassland. Usually common but very local. Larvae feed on monocotyledons, reportedly on *Festuca*. Adults from Cochetopa Hills are grayer than those elsewhere. Many adults fed on mud by landing on the downwind side of a pond then flapping and crawling toward the mud.

O. uhleri (Reak). 13 loc: Wet Mts. (Rosita (Nash), north and NW of Greenhorn Peak), Sangre de Cristo Mts. (only in the Rio Grande side

except on Poncha and La Veta Passes) and the Cochetopa Hills, 8900-10500', in bunch-grass habitats. One brood, early June-early July (range May 27-July 17). Common but local. Larvae probably feed on bunch grasses. Adults feed on mud and rarely on flowers.

O. melissa lucilla B. & McD. 4 loc: Sangre de Cristo Mts. (so far only south of Hayden Pass southward to Mt. Blanca). 12000-13800', on alpine ridges. One brood, July 2-Aug. 1. Often common. Larvae feed on monocotyledons, including *Carex*.

Erebia magdalena Stiecker 8 loc: Sangre de Cristo Mts. on Mt. Blanca and north and south of Hayden Pass, 11600-13800', flying over rockslides. One brood, July 3-Aug. 5. Uncommon, occasionally common. Larvae undoubtedly feed on monocotyledons, including *Carex* (oviposition observed by J. Emmel, pers. comm.), and eat *Poa pratensis* in the lab (reared by Michael Young).

E. epipsodea Butt. 12 loc: Sangre de Cristo Mts. (at least south of Hayden Pass to La Veta Pass), and mountains west of the San Luis Valley (Bonanza, Cochetopa Hills), absent from the Wet Mts., 9200-13000', in moist meadows and swales. Most records in this area are above timberline, contrasting with the Front Range where some colonies occur in the foothills as low as 6800' (in late May-mid June). One brood, June 17-July 19 below timberline, July 16-Aug. 1 (extreme Aug. 23) above timberline. Common. Larvae feed on various grasses and sedges. Adults rarely feed on flowers (white *Saxifraga* etc.), sometimes feed on mud.

Libytheidae

Libythea bachmanii larvata (Strecker) Two strays from farther south were caught near Pueblo by Maurice Howard, Aug. 9 and Sept. 2, one San Luis Valley So. of Moffat (J. Brock, Aug. 8).

Lycanidae

Apodemia mormo near *mejicanus* (Behr) 33 loc: throughout the area including the plains north of Pueblo and the Wet Mtn. and San Luis Valley floors, 5000-9000', in grassland, chaparral, and pinon-juniper woodland etc., always on or near *Eriogonum jamesi*. One brood, about Aug. 1-26 on the plains, July 21-Aug. 26 in the Arkansas Canyon and Wet Mtn. Valley, July 17-mid Aug. in the San Luis Valley (extremes July 1-Aug. 30). Uncommon to common. Larval host *Eriogonum jamesi* (several ovipositions observed near Colorado Springs and one east of Buena Vista). Adults feed on *E. jamesi*, sometimes on various other (mainly yellow) flowers. Adults have slightly less red than those from farther south in New Mexico and Texas. Plains individuals are larger than those from the mountains.

A. nais (Edw.) 13 loc: Wet Mtn. foothills, Huerfano Park, the west edge of the Wet Mtn. Valley, the Arkansas Canyon (so far only 12 miles north of Salida to Buena Vista), and the hills bordering the San Luis Valley, 6800-9200', near *Ceanothus fendleri*. One brood, June 22-July 28 in the foothills, early July-Aug. 1 elsewhere. Uncommon. Larval host *Ceanothus fendleri* (Rhamnaceae; ovipositions on leaves next to inflorescence and on a lower branch in Hardscrabble Canyon, Fremont Co.; I reared it on *C. fendleri* elsewhere in Colorado). Adults feed on *C. fendleri*, *Apocynum* (both whitish) and on mud. Strangely, Kendall (1976, for *nais chisosensis*), and Edwards (1868-1897, for *nais nais* from Arizona) give *Prunus* as the larval host.

Hypaurotis crysalus (Edw.) 28 loc: throughout the mountains and plains next to the mountains (south of the Arkansas River to Bull Domingo Hills, and north to Hayden Pass in San Luis Valley drainage, 5850-8700', on *Quercus gambellii*. One brood, June 29-mid Aug. (extreme Aug. 2) in the foothills, July 13-Aug. 28 elsewhere. Usually common, sometimes very abundant. Larval host *Q. gambellii* (ovipositions Lake Creek Campground, Custer Co., Scott 1974e). Adults feed on oak sap, raindrops, and occasionally on mud, never on flowers.

Strymon melinus franki Field. 44 loc: throughout the area, but rare in the Wet Mountain Valley (Rosita, etc.) and San Luis Valley (west of La Veta Pass, Great Sand Dunes), 4300-9000' (usually below 7300'). Perhaps four broods on the plains, April 18-May 21, mid June-July 11, July 22-Aug. 17, late Aug.-Oct. In the Arkansas Canyon records are June 9-July 1, many from July 5-30, and scattered records to Sept. 15. In the Wet Mtn. and San Luis Valleys records are July 3-Aug. 12. Uncommon. Larvae feed on reproductive parts, rarely leaves, of a very wide variety of plants. Adult Theclini, a tribe including *Hypaurotis* to *Callophrys*, feed on many flowers of all colors but primarily of yellow or whitish colors (*Hypaurotis*, *Satyrium acadica* and *sylvinus* seem to be exceptions); the difference in flowers preferred by Theclini and Hesperinae is often noticeable in the field (Scott 1974a). Adults also feed on mud.

Harkenclenus titus (Fabr.) 25 loc: throughout the area except the flat San Luis Valley and Wet Mtn. Valley floors (probable in Huerfano Park) from 4300-9000', near *Prunus virginiana*. One brood, June 24-Aug. 3 on the plains, July 15-mid Aug. (extreme Aug. 27) above 8000'. Uncommon, occasionally common, once by the hundreds on a pure stand of *P. virginiana* plants on the Great Sand Dunes. Larval hosts various *Prunus* (Rosaceae), supposedly on *Quercus* and *Eupatorium*.

Satyrium calanus godarti (Field) 46 loc: throughout the area

including the plains next to the mountains (north in San Luis Valley to Ferguson Creek, south in Wet Mountain Valley to Bull Domingo Hills). 5850-8800', on or near *Q. gambellii*. One female from Junkins Park Creek, 9200', in the Wet Mts. was found far from *Quercus gambellii*. One brood, June 22-Aug. 2 (peak early July) foothills, July 1-Aug. 24 (peak late July) elsewhere. Common. Larval hosts *Q. gambellii* (*Fraxinus* etc. elsewhere).

S. liparops aliparops (Mich. & Dosp.) 8 loc: Wet Mtn. foothills, the Arkansas Canyon, and the northern Wet Mtn. Valley (Lake Creek), 6600-8200', mostly in gulches near or in groves of *Quercus gambellii* and *Prunus virginiana*. One brood, end of June-Aug. 2 in the foothills, July 10-Aug. 7 elsewhere. Rare-uncommon. Larval hosts are various trees and shrubs including *Prunus virginiana*, *Quercus*, *Crataegus*. A published record of *Acer negundo* (Scott et al. 1968) is erroneous.

S. behrii crossi (Field) 27 loc: throughout the mountains, south in the Wet Mtn. Valley to Rosita, north to west of Villa Grove in the San Luis Valley, 6400-8800', near *Cercocarpus montanus*. One brood, June 25-July 25 foothills (peak start of July), July 1-Aug. 3 (extreme June 21, peak mid July) elsewhere. Fairly common. Larval host *Cercocarpus montanus* (associated with in the Pueblo area, ovipositions seen north of the area).

S. sylvinus (Bois.) *ssp.* 16 loc: Wet Mtn. foothills, the adjacent plains (east of Rye, east of Florence, Canon City), all along the Arkansas Canyon, the Wet Mtn. Valley south nearly to Hillside (rare), and the San Luis Valley floor. Probable in Huerfano Park. 5150-7750', on or near *Salix exigua*. One brood, July 7-Aug. 3 foothills and plains, July 10-Aug. 14 elsewhere. Uncommon to common. Larval host *S. exigua* (oviposition Mirage, Saguache Co.) Adults feed on *Asclepias*, *Cirsium*, etc.

S. acadica (Edw.) *ssp.* 2 loc: plains (Pueblo and Canon City), 4800-5300', on or near *Salix exigua*. One brood, July 5-Aug. 2. Uncommon to common but local. Larval host *S. exigua* (oviposition Canon City). Adults feed on *Asclepias*, *Medicago*, *Melilotus*, etc. *S. acadica* and *S. sylvinus* fly in the same willow clump in Canon City.

Callophrys nelsoni siva (Edw.) 39 loc: throughout the mountains, the plains east to Pueblo, south in the Wet Mtn. Valley to Round Mountain, north in the San Luis Valley to near Villa Grove, 4800-8800', on or near juniper trees. One brood, late April-Aug. 1 foothills (peak early June, worn after late June), May 27-July 25 elsewhere (peak late June). Common. Larvae feed on various *Juniperus* spp. I treat *siva*, *loki*, *barryi*, *byrnei*, and *rosneri* as allopatric subspecies of

nelsoni pending proper studies. They tend to intergrade (*loki-siva* populations exist, and the violet ventral color of *nelsoni* occurs in western *siva* populations), and foodplant differences are not clearcut (*nelsoni* occurs on *Juniperus occidentalis*, for instance). John Lane is conducting foodplant studies.

C. spinetorum (Hew). 8 loc: Wet Mtn. foothills, Arkansas Canyon (one record NE of Salida), and mountains surrounding the San Luis Valley. Probable in hills in Huerfano Park and in Wet Mtn. Valley. 6200-9000', in pine forests. One brood, May 1-June 29 foothills, May 28-July 16 (peak late June) at higher elevations. Rare; uncommon around Beulah. Larvae feed on *Arceuthobium* parasitic on many conifers.

C. eryphon (Bois.) 30 loc: throughout the mountains, including the plains-foothills ecotone (north of Goodpasture, etc.), south in Wet Mtn. Valley drainage to Rosita, north in San Luis Valley drainage to Wild Cherry Creek and Luders Creek Camp. Probable Huerfano Park. 6000-9200' (rarely 10000'), in pine forests. One brood, April 24-July 5 (peak late May in foothills), May 26-July 1 elsewhere. Common. Larvae feed on needles (Hardy 1959) and on male cones (Newcomer 1973) of pines; associated with *Pinus ponderosa* and *P. edulis* here.

C. polios obscurus Ferris & Fisher 12 loc: Wet Mts., the west edge of the Wet Mtn. Valley, and the Cochetopa Hills. Probable at proper elevations in other mountains in the area. 7500-10000', on or near *Arctostaphylos uva-ursi* in forests. One brood, April 27-June 4 at lower elevations in Wet Mts., May 3-June 20 elsewhere. Common. Larval host *A. uva-ursi*. Adults feed mainly on *A. uva-ursi* flowers.

C. augustinus iroides (Bois.) 7 loc: Wet Mts., both sides of the Wet Mtn. Valley, and the Cochetopa Hills. Probable in other mountain areas. 8000-10000', on or near *A. uva-ursi*. One brood, May 2-29 in lower Wet Mts., mid May-mid June elsewhere. Uncommon. *A. uva-ursi* is undoubtedly the main or only larval host here. Adults feed on *A. uva-ursi* flowers.

C. mossii (H. Edw.) ssp. 4 loc: Wet Mtn. foothills (Oak Creek Canyon vicinity; Don K Ranch) and Phantom Canyon NE of Canon City, 6400-7500', males in canyon bottoms and females on north-facing hillsides near *Sedum lanceolatum*. One sight record just west of Buena Vista, Chaffee Co., may be this species. One brood, April 19-late May. Uncommon. Larvae feed on *S. lanceolatum*. Adults have a more straight ventral hindwing postmedian line here than in the Front Range.

C. dumetorum homoperplexa B & B. 33 loc: everywhere in the

mountains and on the Wet Mtn. Valley floor around Westcliffe, from 6400-9200', in chaparral, open woodland, grassland, etc. One brood, April 18-July 10 foothills, May 30-Aug. 4 elsewhere. Common. Larval hosts *Eriogonum*, associated usually with *E. jamesi* and rarely with *E. umbellatum* in the Pueblo area. One oviposition on *Ceanothus fendleri* (Scott et al. 1968) was apparently accidental, as this plant does not occur in some sites. Since my revision of *Callophrys* in Howe (1975) I now think that *C. dumetorum*, *affinis*, and *apama* are intergrading subspecies of each other. *C. d. washingtonia* represents an intergrade population between *C. d. dumetorum* and *C. d. affinis*, and *C. d. affinis* intergrades with *C. d. apama* in southern Utah.

Lycaena cupreus snowi (Edw.) 2 loc: Sangre de Cristo Mts. (West Creek Lake, Hermit Pass), 11500-13000', in glacial cirques and other moist hollows where snow lingers, near *Oxyria digyna*. One brood, July 3-Aug. 11. Uncommon. Larvae feed on *Oxyria digyna* (oviposition on rock next to *O. digyna* at Hermit Pass, Custer Co.). Adults feed on various (mostly yellow) flowers.

L. rubidus sirius (Edw.) 49 loc: throughout the area including the plains east of Pueblo and the Wet Mtn. and San Luis Valley floors, 4600-9800', along streams near *Rumex*. One brood, June 15-Aug. 2 plains and foothills, July 8-Aug. 25 (once June 24) in Arkansas Canyon and San Luis Valley, July 15-Sept. 1 Wet Mtn. Valley. Common. Larval hosts *Rumex*, including *R. salicifolius triangulivalvis*, *R. densiflorus*, *R. crispus*, *R. occidentalis*; associated with the last three *Rumex* and with *R. utahensis* at various locations in the Pueblo area. Adult *Lycaena* feed occasionally on mud, often on flowers especially yellowish (sometimes whitish) ones. Females in this area are almost all red dorsally, as are those from the plains in Denver north of this area.

L. heteronea gravenotata Klots. 19 loc: Arkansas Canyon, Wet Mtn. Valley floor and hills, Huerfano Park, and San Luis Valley except the floor (present in foothills of the Front Range but not in foothills in the Pueblo area), 6800-9000', in prairie and woodland near *Eriogonum jamesi*. One brood, July 18-Aug. 24, slightly earlier in the San Luis Valley. Usually uncommon. The major larval host is *E. jamesi* (oviposition SW of Trout Creek Pass, Chaffee Co.), others are *E. umbellatum* and *E. subalpinum*. All specimens in the Pueblo area are the heavily spotted subspecies *gravenotata*.

L. helleoides (Bois.) 34 loc: 1) Ecotype A: the plains, Huerfano Park, Wet Mtn. foothills (rare, near Beulah and Hardscrabble Canyon), and Wet Mtn. and San Luis Valley floors including Rosita (4300-9000', several broods); 2) Ecotype B: the higher Wet and Sangre de Cristo

Mts. including west of the Arkansas Canyon (the species is absent in the canyon bottom), and the mountains surrounding San Luis Valley (Bonanza on the west side) (9000'-11000' except 8000' at Hayden Creek Campground, one brood). Meadows, along streams and ditches, always near *Rumex* or *Polygonum*. Three broods on the plains, May 10-June 14, July 10-early Aug., Aug. 27-Oct. 15. Perhaps three broods in the Wet Mtn. Valley and San Luis Valley, June-mid July, late July-mid Aug., Aug. 18-early Sept. One brood in the higher mountains, July 11-Aug. 25. Common. Larval hosts Polygonaceae in Colorado including *Rumex salicifolius triangulivalvis*, *R. acetosella*, *R. densiflorus*, *Polygonum aviculare*, *P. douglasii*; in the Pueblo area associated with *Rumex crispus* and *Polygonum pennsylvanicum* at low elevations, with *R. densiflorus* and *R. occidentalis* at higher altitudes. Adults feed on many flowers including *Asclepias*, *Achillea*, *Erigeron*, *Potentilla*. J. Scott (in press) shows using extensive foodplant and morphological data that all Colorado material formerly referred to as *helloides*, *dorcas*, and *dorcas florus*, is *helloides*. High altitude material is somewhat darker than at low altitude but much individual variation occurs; the one-brooded "ecotype" in this area is only slightly darker than the several-brooded one. The lightest population in Colorado is on the floor of the San Luis Valley.

L. hyllus (Cram.) 6 loc: plains and Wet Mtn. Valley bottom (a distribution nearly identical to the several-brooded *L. helloides* ecotype), 4300-8000', in meadows and streamsides near *Rumex*. Two broods on the plains, June 15-July 20, Aug. 13-Sept. 10 (extremes June 10-Oct. 2). Apparently one brood in Wet Mtn. Valley, July 21-Aug. 23. Uncommon to common. Larval hosts *Rumex crispus* and *Polygonum coccineum* in Colorado; associated with *R. crispus* and *Polygonum pennsylvanicum* near Canon City. Adults feed on *Asclepias* and other flowers.

L. xanthoides dione Scud. 2 loc: plains (Canon City, Avondale), 4300-5400', in meadows and streamsides near *Rumex*. One brood, June 20-July 26 (extreme June 6). Uncommon to common. Larval hosts *Rumex* (Scott & Opler 1974) including *R. salicifolius triangulivalvis*, *R. crispus*, *R. occidentalis*; associated with *R. crispus* at Canon City. Adults feed on *Asclepias*, and other mostly yellow flowers.

L. arota schellbachi Tilden 44 loc: throughout the mountains including the plains next to the mountains (Crow, etc.), south in the Wet Mtn. Valley drainage to Bull Domingo Hills, north in San Luis Valley drainage to west of Villa Grove. 5900-9000', usually in canyon bottoms near *Ribes*. One brood, July 10-about Aug. 20 (extremes July 1-Sept.

14), peak late July everywhere. Common, sometimes abundant. Larval hosts *Ribes* (Scott 1974d) including *R. leptanthum* (ovipositions Spring Creek, Fremont Co.). Adults feed on many (mostly yellow) flowers, on *Rubus* berries, occasionally on mud.

Plebejus melissa melissa (Edw.) 76 loc: throughout the area, 4300-10600' (usually under 9000'), mostly in grassland habitats. Apparently four broods on plains, May 4-June 4, June 13-July 13, July 19-Aug. 16, Aug. 24-Sept. 13 (one record Oct. 22). Two, perhaps three broods at higher elevations, May 26-July 13, July 18-Sept. 10 (peaks in late June, late July, late Aug.). Common. Larval hosts many legumes, including *Astragalus bisulcatus* (larvae raised by W. H. Edwards from Pueblo), *A. miser* (15 ovipositions mainly on stems, 2 mi. E. of Alamosa, Alamosa Co.), *Oxytropis sericea* (4 eggs on lower stems, NW of Gardner, Huerfano Co.). Adult Plebejini feed on many flowers, and seem to prefer yellow slightly more than blue or red-blue ones. They often feed at mud, and sometimes (*Everes*, *Celastrina*) congregate there.

P. acmon lutzi dosp. 35 loc: throughout the area, 4300-12500' (usually below 9000', but apparently breeding above timberline in the Sangre de Cristos at Dry Lakes, Hermit Pass, Baldy Peak), mostly in grassland habitats on *Eriogonum*. Three broods on the plains, May 4-June 8, June 26-July 31, Aug. 18-Sept. 14. One brood above timberline, July 16-29. Two broods at middle elevations, June 12-July 10, July 18-Aug. 28. Common. Larval hosts *Eriogonum effusum* (ovipositions on pedicels at Westcliffe; the main or sole host below timberline), associated with *E. flavum* above timberline on Baldy Peak, with *E. cernuum* at Kerr Gulch. The dorsal hindwing orange border is narrower at high altitude. San Luis Valley individuals more closely resemble the ssp. *texanus* Goodpasture than ssp. *lutzi* (Goodpasture, 1973).

P. saepiolus whitmeri Brown. 57 loc: throughout the mountains and mountain valleys (not in the arid San Luis Valley floor or in the lower foothills, and in the Arkansas Canyon only in side canyons), 7000-12850', in meadows and streamsides near *Trifolium*. One brood, June 4-July 26 (peak end of June) in the lower Wet Mts., July 3-Aug. 11 near timberline, June 14-Aug. 28 (peak about July 10) elsewhere. Common, especially near timberline, but uncommon at the lowest elevations (a colony occurs on the plains in Boulder County east of the Front Range). Larval hosts many *Trifolium*.

P. icarioides lycea (Edw.) 38 loc: throughout the mountains (absent in the lower foothills, absent Arkansas Canyon bottom except in side

canyons such as Hayden Creek), 7000-10500', near *Lupinus argenteus*. One brood, June 14-Aug. 16 (few upper foothills records, apparently early June-mid July). At high elevations in Clear Creek and Eagle Counties females are largely blue; this phenotype occurs as far south as Pine Creek in Chaffee County. On the plains just north of this area an ecotype similar in appearance to the main ecotype, associated with late-blooming *L. argenteus*, flies from Aug. 5-Sept. 9. Common. Larval

hosts *Lupinus*, mainly or entirely *L. argenteus* in the Pueblo area.

P. icarioides lycea (Edw.) 38 loc: throughout the mountains (absent in the lower foothills, absent Arkansas Canyon bottom except in side canyons such as Hayden Creek), 7000-10500', near *Lupinus argenteus*. One brood, June 14-Aug. 16 (few upper foothills records, apparently early June-mid July). At high elevations in Clear Creek and Eagle Counties females are largely blue; this phenotype occurs as far south as Pine Creek in Chaffee County. On the plains just north of this area an ecotype similar in appearance to the main ecotype, associated with late-blooming *L. argenteus*, flies from Aug. 5-Sept. 9. Common. Larval hosts *Lupinus*, mainly or entirely *L. argenteus* in the Pueblo area.

P. shasta pitkinensis F.8 loc: Wet (Greenhorn Peak) and Sangre de Cristo Mts. (north and south and including Hayden Pass), 10700-13000', on cushion plant community on partly bare ground on subalpine or alpine slopes and ridgetops. One brood, July 13-Aug. 16. Common. Larval hosts legumes including *Trifolium dasyphyllum* (ovipositions Baldy Peak). There is some geographic variation in male color: Hermit Pass, gray-blue; Baldy Peak, West Creek, and Hayden Pass, more azure blue, especially the latter; Greenhorn Peak, more sky-blue; Loveland Pass and San Juan Mountains, smaller, more violet blue; Moffat County, violet blue, wider dark dorsal border. Weak movement has apparently allowed local phenotypes to evolve.

Plebejus glandon rustica (Edw.) 57 loc: almost everywhere in the mountains, 6800-13600', in high prairie (Westcliffe), pinon-juniper (Arkansas Canyon and in the San Luis Valley SW of Villa Grove), and alpine tundra. One brood, at least June 17-July 10 foothills (peak late June), July 5-Aug. 16 above 10000', May 26-Aug. 28 (mainly late June through July) elsewhere. Common. Larval hosts Primulaceae: *Androsace septentrionalis* (oviposition and 26 eggs found, 21 on underside of leaves, 1 on upperside, 4 on calyx, NE of Salida) at low altitudes, *A. carinata* (ovipositions at Hermit Pass) above timberline. *Plebejus* is the genus *glandon* is now placed in (J. Downey, in Howe

1975). I use *glandon* rather than *aquilo* for the species' name because Colorado material resembles European *glandon* rather than *aquilo*, Colorado foodplants are Primulaceae like European *glandon* rather than *Astragalus*, the foodplant of European and North American *aquilo*, and because *glandon* was named before *aquilo* (in case these two are conspecific).

Euphilotes battoides centralis (B. & McD.) 40 loc: throughout the area including the plains near Pueblo (and east to Baca County), the Wet Mtn. Valley floor and hills south to Rosita, the San Luis Valley hills north to west of Villa Grove, 5000-9000', always on or near *Eriogonum jamesi* in grassland or open woodland. One brood, August on the plains, June 16-Aug. 20 (mostly July 10-Aug. 6) elsewhere. Uncommon, common in some years. Larval host *Eriogonum jamesi* throughout this area.

E. rita coloradensis (Mattoni) 10 loc: Wet Mtn. Valley bottom from just south of Westcliffe north to the Arkansas Canyon; Arkansas Canyon from Texas Creek to Chalk Creek, and hills in the San Luis Valley (west of Villa Grove, Great Sand Dunes), probable in Huerfano Park. It occurs on the plains east of Colorado Springs but not in the lower hotter areas here and near Denver although *Eriogonum effusum* is common on these plains. 6300-8200', in grassland or pinon-juniper woodland on *E. effusum* (growing on pure sawdust at one site). One brood, July 18-Aug. 25 (so far July 18-22 in San Luis Valley), later northeast of the area on the plains. Uncommon, abundant in some years. Larval host *E. effusum* (ovipositions on flowers at Westcliffe).

E. spaldingi. (B. & McD.) 3 loc: mountains on the west side of the San Luis Valley just south of the Rio Grande, 8500-8900', in open pine woodland, June 30-Aug. 5. Uncommon, abundant in some years. Larval host *Eriogonum racemosum*; adults feed on *E. jamesi* and other flowers and on mud. The ventral hindwing red band is as wide as on ventral forewing, whereas in Utah it is narrower.

Everes amyntula (Bois.) ssp 34 loc: throughout the mountains including the plains-foothills ecotone, 6000-9400', in chaparral or oak woodland mostly in valley bottoms. Apparently two or three broods in the foothills, April 28-June 4, June 12-July 7 (perhaps one long brood but records peak in mid May and late June), July 26-Aug. 3 (much less common, perhaps a partial brood); two broods elsewhere, June 10-mid July, mid-July-Aug. 27 (the second brood perhaps partial). Common in spring, less common later. Larval hosts various legumes; associated with *Astragalus miser* at Lake Creek Campground, Custer Co.

E. comyntas (Godart) 4 loc: plains and lower foothills, sympatric with *E. amyntula* in Hardscrabble Canyon, 4300-7000', in meadows and streamsides near *Trifolium repens*. Apparently three broods, mid May-early June, late July, Aug. 16-Sept. 13, and some records between these three periods. Uncommon early in the year but common in late summer. Larval hosts legumes including *Trifolium repens* (ovipositions on and between flowers east of Colorado Springs, El Paso Co.). Adults feed on *T. repens* and other flowers. Records for *comyntas* and *amyntula* are based on genitalic identification.

Glaucopsyche lygdamus oro Scud. 46 loc: almost everywhere in the mountains, and the plains a few miles east of the mountains, including meadows SW of Westcliffe in the Wet Mtn. Valley and north of Villa Grove in the San Luis Valley, 5800-10600', in grassland, woodland, etc. One brood, April 14-July 2 in plains-foothills, May 24-July 19 elsewhere. Common. Larval hosts many legumes including *Astragalus miser* (12 eggs on flower buds, 11 on immature leaves, 8 on mature leaves at Saguache Park in Cochetopa Hills, associated with *A. miser* on La Veta Pass).

G. pius daunia (Edw.) 11 loc: throughout the mountains, including the Wet Mountain Valley floor south of Westcliffe, probable in valleys flowing into the Arkansas Canyon, so far only in Conejos Co. in the San Luis Valley drainage. 7000-9200', near *Lupinus argenteus*. One brood, May 20-July 4 foothills, June 1-July 19 elsewhere. Rare to uncommon. Larval hosts *Lupinus argenteus* in Colorado; also reported on *Astragalus*.

Celastrina argiolus cinerea (Edw.) 22 loc: throughout the mountains including the plains within a few miles of the mountains, probable in Huerfano Park, along the Arkansas Canyon so far only west of Buena Vista, 6000-11000', mostly along streams and valley bottoms. One brood, April 24-June 28 foothills, May 24-July 15 elsewhere. Uncommon. Larvae feed on buds and flowers of very many plants including *Jamesia americana* and *Humulus lupulus* in Colorado. All the specimens from the Pueblo area are form *violacea*; other Colorado forms do not occur. Forms *lucia* and *marginata* are abundant on the western slope of the continental divide south to Archuleta County Colorado, but are rare in the Front Range of Colorado. Form *pseudargiolus* (a late May white form) occurs west of Denver in the Front Range. Form *neglecta* is rare in Colorado (I caught one just north of the Pueblo area in El Paso Co., Aug. 8, and Marc Epstein caught another in Boulder Co. in Aug.).

Brephidium exilus (Bois.) 8 loc: plains, Huerfano Park, lower foothills

(Phantom Canyon). 1 specimen from the Wet Mtn. Valley floor NW of Westcliffe (7800', July 9) may have bred there; if so, the species probably occurs in the Arkansas Canyon. 4500-6900', near larval hosts mostly on alkaline flats. Perhaps five broods, May 5, June 14, July 15-Aug. 3, Aug. 14-Sept. 14, Sept. 30-Oct. 22. Uncommon, most common in late summer when it is occasionally abundant on the plains. Larval hosts Chenopodiaceae, mainly *Atriplex*. Adults sometimes feed (once seen on *Melilotus alba* flower).

Hemiargus isola alce (Edw.) 51 loc: throughout the area, 4300-12483' (only 5 records above 9200', including north of Greenhorn Peak, and 12483' on Galena Peak). About four broods plains-foothills, May 11-June 3, June 24-early Aug., mid Aug.-Sept. 6, late Sept.-Oct. 22. About two or three broods elsewhere, June 3-July 3, July 11-Aug. 28 (Oct. 25 in San Luis Valley). Common at low elevations in some years, especially along steams near *Trifolium repens*. Larval hosts legumes including *T. repens* (ovipositions on flowers at Wetmore).

Leptotes marina (Reak.) 13 loc: plains, Arkansas Canyon, northern Wet Mtn. Valley (west of Hillside), and San Luis Valley (Rito Alto Creek), probable Huerfano Park. The species is migratory, but may overwinter occasionally. 4300-8500', most frequent on the plains in irrigated or streamside habitats. Almost continuous records from May 22-Oct. 22 suggest perhaps four broods. Uncommon, most common in late summer. Larval hosts legumes.

Hesperiidae

Epargyreus clarus (Cram.) 12 loc: plains, all along the Arkansas Canyon, Huerfano Park, and the San Luis Valley drainage (La Veta Pass), probable in Wet Mtn. foothills. 4300-7000' in most of Colorado, but in Huerfano Park and Las Animas County it often occurs up to 11600'. Usually in valley bottoms. One brood, mid June-mid July (extremes May 27-Aug. 1, usually July at higher elevations. Uncommon. Larval hosts legumes including *Robinia neomexicana* and *Glycyrrhiza lepidota* in Colorado. Adult Pyrginae very often feed on flowers of all colors, often bluish ones, and on mud (more specific data are given below for some uncommon species).

Thorybes pylades (Scud.) 16 loc: Wet Mtn. foothills and plains-foothills ecotone, Arkansas Canyon (Hayden Creek Picnic Ground) and Wet Mtn. Valley drainage (near Rosita, 9200'), probable Huerfano Park and possible San Luis Valley drainage, 6000-usually 8400', mostly in canyon bottoms. One brood, May 11-July 11 (mostly May 25-June 30). Uncommon. Larval hosts legumes.

T. mexicana nevada Scud. 35 loc: throughout the mountains (absent

on the Wet Mtn. and San Luis Valley floors), 7000-12500' (usually below 10700'), in aspen parkland, and occasionally above timberline in both ranges. One brood, May 29-June 29 foothills, June 3-Aug. 1 elsewhere (usually July above 10000'). Uncommon-common. Larval hosts legumes.

Erynnis icelus (Scud. & Burgess) 21 loc: throughout the mountains, 7000-10000', near *Populus tremuloides*. One brood, mid May-June 26 at lower altitudes, May 24-July 14 elsewhere. Uncommon. Larval host *Populus tremuloides*.

E. brizo burgessi (Skin.) 30 loc: foothills and adjacent plains, Arkansas Canyon, northern Wet Mtn. Valley (11 mi. NE Silver Cliff; a record for Hermit Lake road may refer to *icelus*), and San Luis Valley drainage (Garner Creek), probable Huerfano Park, 5800-8800', near *Quercus gambellii*. One brood, April 13-June 8 (extreme June 21) foothills, four records April 25-July 12 elsewhere. Common. Larval host *Q. gambellii*.

E. telemachus Burns 59 loc: throughout the mountains including the plains-foothills ecotone, south in the Wet Mtn. Valley drainage to Bull Domingo Hills, north in San Luis Valley drainage to Ferguson Creek. 5800-8500', near *Quercus gambellii*. One brood, April 13-July 11 foothills, April 25-Aug. 4 (usually mid May-mid July) elsewhere. Common. Larval host *Q. gambellii*.

E. horatius (Scud. & Burgess) 21 loc: foothills and plains-foothills ecotone, Arkansas Canyon, and Wet Mtn. Valley drainage south to Bull Domingo Hills, probable Huerfano Park, possible San Luis drainage (present along the Rio Grande farther south), 5600-8400', near *Quercus gambellii*. Two broods, April 13-May 26, June 22-Aug. 26 foothills, second and probably the first brood slightly later elsewhere, July 24-Aug. 24. Uncommon. Larval host *Quercus gambellii*.

E. zarucco funeralis (Scud. & Burgess) Two migrants from farther south were caught at Hardscrabble Canyon (Sept. 4, Robert Price, oral commun. 1971) and Pueblo (Nash, 1893). The species apparently cannot overwinter here.

E. martialis (Scud.) 3 loc: Wet Mtn. foothills (near and north of Beulah) and Huerfano Park (La Veta), 6400-7000' near *Ceanothus fendleri*. One brood, May 7-mid June (rarely to July). Uncommon. Larval host *C. fendleri*.

E. pacuvius (Lint.) 15 loc: foothills, Arkansas Canyon (Hayden Creek Campground), all along both sides of the Wet Mtn. Valley (Music Pass Road, Rosita), San Luis Valley drainage (Music Pass, Mt. Blanca), probable Huerfano Park. 6400-9400', in chaparral and pine woodland.

One brood, May 7-July 6 foothills, May 26-July 30 (once Aug. 10) elsewhere. Uncommon. Larval host *Ceanothus fendleri*.

E. persius fredericki Freeman 57 loc: throughout the mountains, but rare in plains-foothills ecotone (near Stinking Spring), several records along streams on the Wet Mtn. and San Luis Valley floors, 6000-12349' (usually below 10500', but 9 records above 10300' in all three ranges). One brood, May 25-July 11 foothills, May 25-Aug. 1 (once Aug. 16) elsewhere. Common. Larval hosts legumes in western U.S. including *Astragalus* sp. probably *bisulcatus* (oviposition at Rosita).

E. afranius (Lint.) 11 loc: plains within 5 miles of the mountains, the foothills, Arkansas Canyon, probable lower Huerfano Park. Present in Rio Grande drainage farther south in New Mexico, but apparently not in San Luis Valley here. 5500-7000', in prairie gulches and pinon-juniper woodland. Two broods, April 23-May 19, July 2-Aug. 1 (late records Aug. 16 and Sept. 5). Uncommon. Larval hosts legumes including *Lupinus argenteus* and *Astragalus*; *Lupinus* does not occur at several plains localities so another legume must be used there.

Pholisora alpheus (Edw.) 14 loc: plains west to the foothills and east to La Junta, Arkansas Canyon, Huerfano Park, and San Luis Valley floor (Saguache and Manassa), 4300-7700', in gulches and alkaline flats near *Atriplex canescens*. Apparently two broods, May 15-June 23 (worn), July 3-Aug. 5 (worn) plains (a third brood may occur on the plains), so far only June 8-24 in Arkansas Canyon and San Luis Valley. Uncommon, rarely abundant. Larval host *A. canescens*. Adults feed on *Medicago* and other flowers. Some individuals here resemble the western slope subspecies.

P. catullus (Fabr.) 27 loc: plains, foothills, Arkansas Canyon, Wet Mtn. Valley floor south to Lake Creek, Huerfano Park, San Luis Valley floor (SE Monte Vista), 4300-8900' (usually below 7600'), along roadsides and railroad tracks, and in gulch bottoms. Dates almost continuous from May 10-Sept. 8 on the plains-foothills may represent three broods. Two broods Arkansas Canyon, June 12-27, July 30-Sept. 10. Perhaps one brood, June 21-July 28 elsewhere. Uncommon, sometimes common. Larval hosts Chenopodiaceae and Amaranthaceae in Colorado including *Chenopodium album*, *Amaranthus retroflexus* (larvae raised from El Paso Co.), *A. graecizans*, *A. albus*. 35 Colorado larvae placed on *Marrubium vulgare*, *Verbena bracteata*, *Monarda* sp., and *Ambrosia* sp., all published or suspected hosts in other plant families, did not eat any of these four plants.

P. mejicana (Reak.) 6 loc: north half of the Wet Mtn. foothills, and the Arkansas Canyon. Probable lower Huerfano Park and possible on the plains (present on the plains next to the mountains near Colorado

Springs), 6600-7400', in gulch bottoms, along railroad tracks, always sympatric with *catullus* and with identical behavior. Two broods, June 3-July 7, July 15-Aug. 26. Uncommon, rarely abundant. Larvae feed on *Amaranthus retroflexus* (larvae raised to adults from N. of Colorado Springs, El Paso Co.) and *A. graecizans* (oviposition Kerr Gulch, Fremont Co.). First instar larvae will eat test leaves of *Chenopodium album*, and K. Roever reports *Chenopodium* as the foodplant in New Mexico, but this plant is not attacked in El Paso Co. where *A. retroflexus* plants may have up to 8 larvae. Adults feed mainly on low flowers (blue *Verbena bracteata*, *Lappula redowskii*, *Cirsium arvense*, etc.) and mud. *P. catullus* and *mejicana* have identical behavior and adult and larval foodplants. (I reared both from the same plant) yet they continue to coexist.

Pyrgus centaureae loki Evans 6 loc: Wet Mts. (Greenhorn Peak to 10 mi. NW) and Sangre de Cristo Mts. (Hermit Pass, Baldy Peak, West Creek Lake), 10500-13000', in subalpine and alpine meadows. One brood, June 21-Aug. 11. Uncommon. Larvae feed on *Potentilla diversifolia* in Colorado, and on *Fragaria* elsewhere. *Epargyreus*, *Thorybes*, *Erynnis*, and *Pholisora* adults feed on flowers of all colors; *Pyrgus* seems to visit yellow flowers slightly more than other colors.

P. scriptura Bois. 21 loc: plains, foothills edge, Arkansas Canyon, Wet Mtn. Valley floor south to south of Silver Cliff, probable Huerfano Park, the San Luis Valley floor and hills north to west of Villa Grove. 4700-8400', on prairie or open pinon-juniper woodland. Three broods on plains, and perhaps in Arkansas Canyon, April 28-late May, June 16-July 22, late Aug.-mid Sept. Two broods in Wet Mtn. Valley, mid May-mid June, July 15-Aug. 22. Uncommon. Larval hosts Malvaceae including *Sphaeralcea coccinea* in Colorado.

P. xanthus Edw. 7 loc: Wet Mts. (Custer and Huerfano Counties), Sangre de Cristo Mts. (Poncha Pass) and Cochetopa Hills, 8900-10500', in grassland or openings in forest. One brood, May 26-June 20 (extremes May 3-July 3). Uncommon. Larval hosts *Potentilla* (Scott 1975a), associated with *P. hippiana* (misidentified by botanists as *P. anserina* when reported by Scott 1975a) in southern Colorado and the Pueblo area. Adults feed on *Taraxacum*, mud, manure, etc. Nash's (1893) record of *P. ruralis* from Rosita undoubtedly refers to *xanthus* which flies there.

P. communis (Grote) 42 loc: throughout the area, 4300-10800' (usually below 9000'). About four broods plains, May 11-June 3, June 13-July 5, July 22-Aug. 17, Sept. 2-Oct. Records are very similar elsewhere except there are fewer May (27-28) and Sept. (10-19)

records. Common. Larval hosts Malvaceae including *Sphaeralcea coccinea* in dry plains (ovipositions Westcliffe and Bull Domingo Hills in Custer Co.), *Malva neglecta* in disturbed areas (oviposition Coaldale in Fremont Co.), and *Sidalcea neomexicana* in wet meadows.

Piruna pirus (Edw.) 34 loc: throughout the mountains, south in Wet Mtn. Valley drainage to Bull Domingo Hills (and supposedly Music Pass, Nash 1893), north around San Luis Valley to mountains east and west of Villa Grove, in Huerfano Park along streams. 6400-9000', in moist valley bottoms. One brood, June 4-July 11 (once Aug. 2) foothills, June 5-July 29 Arkansas Canyon, June 22-Aug. 9 San Luis Valley. Usually uncommon, common in San Luis Valley. Larval hosts probably valley bottom grasses such as *Poa*. Adults feed on flowers of all colors, mainly blue.

Oarisma garita (Reak.) 40 loc: throughout the mountains, absent in the Arkansas Canyon bottom, 6400-10500'. One brood, June 20-July 13 foothills, June 24-Aug. 1 (extreme Aug. 12) elsewhere. Common. Larval hosts grasses including *Sitanion hystrix* (oviposition Round Mountain, Custer Co.), *Blepharoneuron tricholepis* (oviposition NE Rosita), *Stipa columbiana* (oviposition Bull Domingo Hills). Adults feed on various flowers of all colors, often yellow *Compositae*.

O. edwardsii (Barnes) 12 loc: Wet Mtn. foothills and Arkansas Canyon, probable Huerfano Park, 6400-7500', in openings in chaparral and woodland, often in drier areas than *garita*. One brood, June 20-July 17 foothills, July 1-25 Arkansas Canyon. Uncommon, sometimes common. Larvae probably feed on grasses. Adults feed on many flowers of all colors: *Astragalus*, *Geranium*, *Lesquerella*, *Linum*, *Ceanothus*, *Penstemon*, *Apocynum*, etc.

Yvretta rhesus (Edw.) 20 loc: plains, lower foothills, Arkansas Canyon, Wet Mtn. Valley bottom south to Westcliffe and Rosita, San Luis Valley bottom north to 9 mi. NW Villa Grove, probable Huerfano Park, 4300-8400' (one record 9000'), on prairie or open pinon-juniper woodland. One brood, April 30-June 4 plains-foothills, May 20-June 25 (worn) elsewhere. Uncommon. Larvae lay eggs on *Bouteloua gracilis*. Adults feed mainly on whitish *Astragalus drummondi* flowers.

Stinga morrisoni (Edw.) 15 loc: Wet Mts. (only two records in the foothills, south of Canon City and Phantom Canyon), Arkansas Canyon, hills in Wet Mtn. Valley south to Bull Domingo Hills, Huerfano Park, around San Luis Valley north to Hayden Pass Creek, 6000-9600' (usually 7000-8700'), pinon-juniper or ponderosa forest. One brood, May 3-June 24 foothills, May 24-July 3 (rarely 15) elsewhere. Usually uncommon, common in San Luis Valley. Larvae

probably feed on various grasses. Adults of *Stinga* and the following Hesperinae unless otherwise noted often feed on flowers, such as reddish blue *Cirsium*, *Medicago*, *Monarda*, *Lonicera*, sometimes on yellow *Opuntia*, *Solidago*, etc., and on mud.

Hesperia uncas Edw. 39 loc: plains, foothills edge, Arkansas Canyon, Wet Mtn. Valley floor and bordering hills, Huerfano Park, and San Luis Valley floor and occasionally the bordering hills, 4300-9000' (9800' at Lapin Creek in Wet Mts.; 12500' Galena Peak and 13000' Hermit Pass in Sangre de Cristo Mts., possibly breeding there), on prairie and pinon-Juniper woodland. Two broods on the plains-foothills, May 25-June 22, July 31-Aug. 30, several records between these dates. Apparently one brood elsewhere, June 11-Aug. 4 (extreme Aug. 24). Common. Larval hosts *Bouteloua gracilis* (three ovipositions near Westcliffe, Custer Co., one near Salida, Chaffee Co.).

H. comma (Linn.) *ssp.* 46 loc: throughout the mountains including the hills in the Wet Mtn. Valley (Bull Domingo Hills, Promontory Divide), 6500-9000' (rarely 9600'), in woodland or prairie. One brood, July 28-Sept. 10 (extremes July 21-Sept. 26). Common. Larval hosts probably various grasses, but females oviposit haphazardly on grasses, sedges, and *Arenaria* (a dicotyledon resembling grass) (Scott 1975b). *H. comma* occurs on the plains near the Black Forest in the Arkansas-South Platte River divide, but not on the plains here. Specimens from our area are an undescribed subspecies with bright yellow ventral hindwing with a silver chevron, which intergrades with subspecies *colorado* (which does not occur here) between Buena Vista and Tennessee Pass, and in the mountains west of the San Luis Valley (Scott 1975b).

H. leonardus pawnee Dodge. 3 loc: plains near the mountains, 6000-6600', on prairie habitats. One brood, mid Aug.-mid Sept. Common. Larval hosts grasses. Specimens have slightly larger traces of ventral hindwing spots here than elsewhere on the Colorado plains. Adults feed mainly on *Liatris punctata*, which blooms at the same times and location as the butterfly.

H. pahaska Leussler 43 loc: throughout the mountains including the plains-foothills ecotone, S in Wet Mtn. Valley hills to Rosita, N in San Luis Valley hills to Hayden Pass Creek, 5600-9600' (usually below 9000'), in chaparral or woodland. One brood, June 3-July 13 foothills, June 9-July 29 (ocasionally to Aug. 17) Arkansas Canyon, June 12-Aug. 4 (once Aug. 16) elsewhere. Common. Larval host mainly *Bouteloua gracilis* (ovipositions Bear Creek, Chaffee Co., Scott 1974a).

H. viridis (Edw.) 54 loc: throughout the area, south in hilly areas of Wet Mtn. Valley to Bull Domingo Hills, N in San Luis Valley floor so far only to the Sand Dunes, 4300-8200', on prairie, chaparral, woodland. Two or three broods on the plains, May 25-June 18, July 7-Aug. 5, records Aug. 13 and Sept. 2 may represent a partial third brood. Two broods in Arkansas Canyon and the Wet Mtn. foothills, May 30-July 3, July 10-Aug. 7, and scattered records until Sept. 10. One brood Wet Mtn. and San Luis Valleys, June 30-July 28 (once Aug. 18). Common. Larval hosts *Bouteloua gracilis* (ovipositions Bear Creek, Chaffee Co., Scott 1974a).

H. nevada (Scud.) 33 loc: throughout the Wet, Sangre de Cristo, and Cochetopa Mts., extending into Wet Mtn. Valley drainage to Ben West Hill and Promontory Divide, and to the edge of the San Luis Valley NE of Fort Garland, 6800-10500' (rarely up to 11500'), most often in aspen parkland. One brood, mostly June 14-July 10 (extremes May 26-Aug. 16), June 15-July 27 above 10500'. Common. Larval hosts grasses including *Koeleria* (oviposition at Rosita, Custer Co.).

Polites sonora utahensis (Skin.) 3 loc: around the San Luis Valley (Ferguson Creek, W of Saguache, W of Villa Grove); also present 3 miles south of Buena Vista just north of the area and north of the Arkansas Canyon, 8200-9800', in moist meadows almost always with *Cirsium drummondii* var. *acaulescens*. Such meadows occur in the Wet Mts. and Wet Mtn. Valley, but numerous trips have failed to produce it there. One brood, July 19-Aug. 22. Uncommon-common. Larvae probably feed on wet meadow grasses; adults feed mainly on *acaulescens*, occasionally on other flowers such as *Taraxacum*, and on manure and mud.

P. sabuleti (Bois) *ssp.* 8 loc: San Luis Valley floor north to San Isabel Creek, and the upper Arkansas Canyon, 6600-7800', in moist meadows where *Eragrostis trichodes* is common. One brood, June 17-late July, occasionally to Aug. 6. Common. Larval hosts *E. trichodes* (oviposition on *E. trichodes*, 11 eggs found on *trichodes*, 5 on *Equisetum*, 1 on a dicotyledon, all growing near *trichodes* in the Arkansas River Canyon). Adults feed on *Medicago*, *Polygonum*, *Aster*, etc. Adults lack the dark post-stigmal patch present in Great Basin specimens. Ground color of the wings is lighter in Pueblo area specimens than in Great Basin specimens; ground color is slightly lighter in the San Luis Valley specimens than in Arkansas Canyon specimens.

P. draco (Edw.) 48 loc: all three mountain ranges, 8400-12500' (7800' at Hayden Creek Campground, infrequent above 11500'), in

moist swales and valley bottoms. One brood, June 19-Aug. 1 (extremes May 28-Aug. 23). Uncommon. Larvae feed on unknown monocotyledons. Adults feed on various yellow and blue composites, etc.

P. themistocles (Latr.) 27 loc: Wet Mts. (mainly the foothills), Wet Mtn. Valley floor (one record 8 mi. E. Westcliffe), Huerfano Park, Arkansas Canyon, San Luis Valley drainage (5 mi. S. Poncha Pass: Medano Creek), 6600-9000', in moist meadows or moist valley bottoms. Absent on plains, even though it feeds on lawns on the plains northward at Denver, where it has two broods. One brood in the Pueblo area, June 12-July 11 foothills and Arkansas Canyon (late records July 17, Aug. 8 and 24 in Arkansas Canyon), June 27-Aug. 1 (late records Aug. 10 & 28) elsewhere. Uncommon-common. Larval hosts grasses.

P. origenes rhena (Edw.) 7 loc: Wet Mtn. foothills, 6600-7600', in valley bottoms with tall grasses including *Poa* sp. One brood, June 20-July 13. Uncommon, abundant once. Larval hosts grasses.

Atrytone delaware (Edw.) 1 loc: Wet Mtn. foothills (Oak Creek Canyon, syntype of *lagus*), possible on moister areas of the plains in wet tall-grass valley bottoms. One brood, June 25-July 25. Locally common. Larval hosts grasses.

Ochlodes snowi (Edw.) 18 loc: Wet Mts. above the foothills (a record from "Beulah", is undoubtedly from higher mountains), Arkansas Canyon above the bottom, Sangre de Cristo Mts. west of Huerfano Park, and hills surrounding San Luis Valley, apparently absent on hills west of Wet Mtn. Valley due to heavy forest, 7500-9600', mainly in upper edge of the *Pinus ponderosa* belt. One brood, July 12-Aug. 4 (peak late July, once Aug. 9). Uncommon, occasionally abundant. Oviposition is on *Blepharoneuron tricholepis* (Rosita, Custer Co., Scott 1974a). Adults feed mainly on blue-purple flowers, especially legumes (*Oxytropis*, *Astragalus*, etc.) and *Penstemon*.

Poanes hobomok (Harris) *ssp.* 10 loc: throughout the Wet Mtn. foothills and foothills-plains ecotone from near Rye to Oak Creek, including the divide between South Hardscrabble Creek and North Creek, 6000-7800', in dense oak-ponderosa-*Poa* habitat, rarely in open areas. It also occurs south of the area on Raton Mesa; elsewhere it only occurs in eastern U.S. west to Nebraska. One brood, May 25-July 7 (peak about June 20; a May 5 record at plains-foothills ecotone in 1972, a very early season). Common. Larval hosts grasses. This population is slightly lighter with slightly narrower dark wing borders and less sexual dimorphism than eastern U.S. specimens.

P. taxiles (Edw.) 45 loc: throughout the mountains, hills in the Wet

Mtn. Valley south to Bull Domingo Hills, mountains surrounding San Luis Valley north to Hayden Pass Creek, and on the plains along streams east to Pueblo, 4800-8800', in valley bottoms and in cottonwood groves, usually in semi-shaded areas, and flying in cloudier weather than *P.hobomok*. One brood, June 17-Aug. 2 (extremes June 12-Aug. 9) Common. Oviposition is known on four species of grasses in Colorado including *Puccinellia airoides* and *Agropyron smithii*.

Euphyes vestris metacommet (Harris). 52 loc: foothills down to the plains, the Arkansas Canyon, Wet Mtn. Valley hills south to Bull Domingo Hills and Rosita, Huerfano Park. Probable San Luis Valley (known near Mosca Pass, a possible sight record Hayden Pass Creek) as it is present farther south. 5800-9000', (usually below 8500') in moist canyon bottoms. One brood, June 12-Aug. 3 (June 4-Aug. 25 Arkansas Canyon). Common. Larval hosts sedges including *Carex heliophila* in Colorado. Adults feed on various flowers and also on bird droppings.

Atalopedes campestris (Bois.) 10 loc: plains, foothills, and all along the Arkansas Canyon, probable Huerfano Park. 4300-7600', mainly on flats in valley bottoms where *Eragrostis* is common, and in suburbs of towns. A record from Ophir Creek, 9800' (Aug. 25) in Wet Mts. suggests considerable dispersal, but the species may be native on the plains. Three or four broods on the plains, June 12-24 (once May 8), July 7-Sept. 12 (perhaps 2 broods), Oct. 1-Nov. 2. One brood June 10-Aug. 6 Arkansas Canyon. Uncommon. Larval hosts grasses.

Amblyscirtes simius (Edw.) 24 loc: plains, northern Wet Mtn. foothills south to Oak Creek, Arkansas Canyon, Wet Mtn. Valley (Bull Domingo Hills), San Luis Valley hills north to W of Villa Grove, probable Huerfano Park, 4800-8400' (one record 9000' NE of Salida), in prairie and pinon-juniper woodland. One brood, June 3-25 (sometimes July 5) plains, June 9-30 (once July 11) Arkansas Canyon, 5 dates July 8 to rarely Aug. 2 above 8000'. Uncommon, sometimes abundant. Larval host *Bouteloua gracilis* (Bear Creek, Chaffee Co., Scott 1973a).

A. phylace (Edw.) One male in the foothills N of Arkansas River (Phantom Canyon, 6500', M. Howard), a female on divide at head of Pass Creek, Huerfano Co. (9200'); the species may occur throughout the mountains. In the Front Range it occurs only in foothills and in the Black Forest, but southward it occurs at higher elevations. One brood, May 21-July 7. All *Amblyscirtes* larvae undoubtedly feed on grasses, including *Poa* in the laboratory for *A. aenus*.

A. eos (Edw.) 8 loc: plains and foothills edge, 4500-6000'. Perhaps

three broods, May 5-31, July 3-Aug. 1, Sept. 8. Uncommon-rare, on prairie and chaparral. This species may have invaded southeastern Colorado recently.

A. aenus Edw. 17 loc: Wet Mtn. foothills, Arkansas Canyon, probable Huerfano Park (on the moister plains south of our area), 6000-7300', in canyons and gulches. One brood, May 11-June 24 (extremes April 23-July 4) foothills, late May-June 24 Arkansas Canyon. Uncommon.

A. vialis (Edw.) 12 loc: Wet Mtn. foothills, foothills-plains ecotone, Arkansas Canyon, probable Huerfano Park, 6000-7800', in moister valley bottoms usually with *Quercus* and *Poa* sp. One brood, May 5-July 17 (peak mid June) foothills, June 12-July 17 Arkansas Canyon. Uncommon.

A. oslari (Skin.) 25 loc: plains SW of Pueblo, in the Wet Mtn. foothills, foothills-plains ecotone, Arkansas Canyon, Wet Mtn. Valley drainage (Bull Domingo Hills eastward to Junkins Park and the Road to Locke Park), probable Huerfano Park, 5200-9800', usually in gulches. One brood, April 28-July 13 foothills-plains, records June 4-25 elsewhere. Uncommon-common.

Atrytonopsis hianna turneri Freeman. 9 loc: throughout the Wet Mtn. foothills, 6000-7200', in *Quercus* habitat in canyons. One brood, May 4-June 30. Uncommon-common. Larval host *Andropogon gerardi*, *A. scoparius*.

Atrytonopsis vierecki (Skin.) 12 loc: plains, Arkansas Canyon west at least to Cotopaxi, the Wet Mtn. foothills only near Canon City (N. of Chandler to Phantom Canyon), probable Huerfano Park, never flies with *A. hianna*, 5100-7500', in prairie and pinon-juniper gulches. One brood, May 20-July 4. Uncommon-common. Larvae probably feed on grasses.

Megathymus yuccae coloradensis (Skin.) 6 loc: San Luis Valley hills and floor, Arkansas Canyon (Buena Vista), Wet Mtn. Valley (Rosita, Nash, 1893), foothills (Phantom Canyon), probable on plains and Huerfano Park, 6400-9000', on prairie and pinon-juniper habitat. One brood, May 3-June 2. Uncommon-rare. Larvae feed on various *Yucca* species (tents found east of Villa Grove). Adult *Megathymus* never feed.

M. streckeri. 13 loc: plains, Arkansas Canyon, Huerfano Park (subspecies near *texanus* B. & McD.) and San Luis Valley hills and floor north to W of Villa Grove (subspecies *streckeri* (Skin.), 4300-8400', in prairie and pinon-juniper habitat. One brood, May 26-July 14 plains, June 14-July 24 elsewhere. Uncommon, sometimes common. Larvae feed on various *Yucca* species.

Discussion

Possible Additional or Erroneously Recorded Species

Several species possibly occur in the Pueblo area. *Callophrys sheridanii* occurs on Mt. Elbert, 12000', in the Saguache Range NW of the area (Samuel Johnson collector) and in southern New Mexico. *Oeneis polixenes* occurs in the Front Range and in the Sangre de Cristo Mts. in New Mexico. Isolated relict populations of these two species possibly occur in the Pueblo area. *Speyeria cybele* and *S. hydaspe* occur in the Sangre de Cristo Mts. in New Mexico but not in Colorado. *S. nokomis* occurs on both sides of the Sangre de Cristo Mts. in New Mexico but has not been found at apparently suitable springs in the Pueblo area. *Euchloe hyantis* approaches the area along the Rio Grande farther south in New Mexico. An introduced colony of *Lycaena phlaeas* occurred once (2 specimens) near Colorado Springs NE of this area. *Polites coras* has invaded the Denver area recently and several were caught in Gunnison and Saguache Counties west of the area. Other Front Range species' distributions stop within 50-100 miles of the area (most of these stop more than 30 miles north of the area) but have not been found in the Pueblo area despite intensive search: *Speyeria callippe*, *Chlosyne palla*, *Phyciodes pallida*, *Satyrium californica* and *saepium*, *Hesperia juba* and *otloe*, *Polites mystic*, *Atrytone argos*, and *Ochlodes sylvanoides*. *Papilio indra indra* also was not found (a fresh male in F. M. Brown collection labelled Sand Dunes N. Mon., 8100', 23-vii-34, collection of Bob Potts, may be mislabelled because there are no other records south of Denver, and this subspecies flies only in May and June). *Euphilotes enoptes* does occur in Chaffee County (Silver Plume Creek, 9600') just north of the Pueblo area. However, a record from La Veta Pass (Brown et al. 1957) is very dubious: the specimens have burned, identification by wing pattern is difficult, and we have not found it there. Its usual host *Eriogonum umbellatum* does occur at La Veta Pass, at Promontory Divide, and near Westcliffe but is rare. Several high altitude species occur along the continental divide in Colorado, but not in the Sangre de Cristo Mts: *Erebia callias* and *theano*, *Boloria frigga* and *eunomia*. One male *Oeneis taygete* from Hermit Pass in the Sangre de Cristo Mts., July 29, was found by Maurice Howard. Because of a possibility of label confusion and because this locality has been sampled a dozen times without seeing others, verification is needed. A female recorded as *Plebejus argyrognomon* from Pass Creek (Brown et al. 1957) was since burned, but very probably was *P. melissa*. Nabokov (1949) discusses a female from San Isabel Forest above Beulah, 7500', leg. Stallings, which he questionably determines as *argyrognomon*. This record is

also dubious; the male genitalia is the only reliable character for identifying Colorado *argyrognomon*. *P. argyrognomon* may occur in Cochetopa Hills west of the San Luis Valley. *Oeneis jutta* has been found 3 and 8 mi. N. of Sargents in Gunnison Co. Colorado, and may occur in the Cochetopa Hills in this area. *Copaeodes aurantiaca*, *Ancyloxypha numitor*, and *Euristrymon ontario* occur just southeast of the Pueblo area. At least ten species from Texas occur as strays elsewhere in Colorado and will eventually be found in the Pueblo area.

Geographic Distribution Within the Area

178 species, 160 native and 18 temporary strays, occur in the area. At least 17 other species stray into Colorado and may eventually be found.

The temporary species are all native in Texas, and some are native to New Mexico and Arizona. They are found most often on the plains and lower foothills in the eastern part of the area, less often in the Arkansas Canyon bottom, and rarely in the rest of the area. They evidently arrive mainly from the southeast, especially Texas.

The Wet Mountain foothills have the richest fauna: ignoring strays and the 12 subalpine or alpine species, the foothills from 6000-8000 ft. have 121 species, the Arkansas Canyon (up to 9000 ft.) has 117, the Wet Mountain Valley and its hills (to 9000 ft.) has 114, San Luis Valley and hills (to 9000 ft.) have 113, the plains only have 62 (but many others occur in the plains-foothills ecotone). Fig. 2 illustrates the richness of foothills altitudes.

Distribution within the area seems to depend mainly on climate and suitable habitats rather than on barriers to movement. Alpine species are now apparently unable to disperse from the Sangre de Cristo Mountains to the Wet Mountains. The major barrier to movement of lowland butterflies in the area is the high Sangre de Cristo Range, but this barrier has very seldom impeded the movement of the butterflies (Table 1). Most of the species are quite widespread (Table 1, group 1). These, and most of the others (Table 1, group 2), are distributed in a manner obviously consistent with altitude/temperature gradients (see the climate section below).

Several species superficially seem restricted in distribution due to the Sangre de Cristo Mountains acting as a barrier (Table 1, group 3). This is because the San Luis Valley and Wet Mountains Valley are nearly equivalent in altitude, mean annual temperature, habitats, and in most butterfly species. However, all of the species in group 3 except *L. hyllus*, *S. liparops*, *P. sonora*, and *O. alberta* are present south of the San Luis Valley in the Rio Grande Valley, so that absence in the San

Luis Valley is generally due to the climatic unsuitability of its high elevation. *S. liparops* is present in Gunnison County on the western slope, and may possibly occur in the San Luis Valley. *P. sonora* may have occurred in the Wet Mountain Valley drainage, and then became extinct there. *C. meadii* and *O. alberta* are species which, judging from their widespread but spotty distributions, were formerly widespread but became extinct in all but a few parts of their former range. The larval foodplant of *E. spaldingi* occurs only in the southern San Luis Valley along with the butterfly, but does not reach this area. Therefore, only *L. hyllus* and perhaps *S. liparops* and *P. sonora* seem to be restricted in distribution by being unable to cross the Sangre de Cristo Mountains. Chance dispersal of most butterflies apparently permits them to cross this barrier at low points such as Mosca, Medano, La Veta, Hayden, and Poncha Passes.

Effect of present climate on distribution

Climate varies greatly within the area, and many of the distributions of the species are highly correlated with climatic gradients, especially gradients in temperature. Frost-free period varies from 5.5 months on the plains to less than 2 months in the alpine zone. Mean annual precipitation is lowest in the San Luis Valley (about 9 inches), is about 12 inches on the plains and in Arkansas Canyon at Salida, and 15 inches at Westcliffe (7800 ft.) in the Wet Mountain Valley. It is higher in the mountains: 23 inches at Wetmore (6050 ft.), 30 inches at Rye (6800 ft.) and Fairview (9500 ft.) all in the Wet Mountains, and 24 inches on La Veta Pass (9242 ft.), 41 inches at Hermit Lake (10,000 ft.), both in the Sangre de Cristo Mountains, and probably 30-50 inches at high altitudes in both ranges. Mean annual temperature is better correlated with altitude than is precipitation. It is 51°F at Pueblo, 53°F in Canon City (climate is milder at Canon City than elsewhere because of up and down canyon wind movements in the Royal Gorge), 49° at Wetmore, 47° at Rye, 45° at Salida, 43-44° at Westcliffe and in the San Luis Valley, and about 26° above timberline.

Distributions within the area are very consistent with altitudinal temperature gradients. These factors are apparently the major determinants of distribution, while precipitation seems less important. The San Luis Valley fauna is very similar to the Wet Mountain Valley fauna, and many species extend into these valleys to about the same altitude, 8400 ft. (north to west of Villa Grove, and south to Bull Domingo Hills, respectively). The plains along the Arkansas River are lower altitude, hotter and drier than the plains to the north and south. At least 20 species extend farther east of the mountains north of this

area (in the Black Forest), and farther eastward along the high mesas of the southern border of the state than they do in the the Pueblo area.

Effect of past climate on distribution

There are now large areas separating the localities where some butterflies occur. The alpine and subalpine species, especially, occur in isolated areas. In Colorado, isolated peaks that are now above timberline and have alpine vegetation do not have alpine species unless they are fairly high (more than 1500 ft. above timberline such as Pikes Peak and Spanish Peaks). Isolated peaks only 500 ft. above timberline (such as Greenhorn Peak in the Wet Mountains in the Pueblo area) do not have alpine species. We believe the explanation for this involves both the coldest glacial periods of the Pleistocene and the warmest interglacial periods. Eight subalpine or alpine species (*Boloria frigga*, *improba*, *eunomia*, *Plebejus argyrognomon*, *Oeneis polixenes* and *taygete*, *Erebia callias* and *theano*) are found in disjunct parts of the high mountains of the state, apparently because they became extinct in the other alpine areas for reasons other than climatic changes.

Quaternary climate has been both colder and warmer than it is now. During one late period of maximum glaciation, molluscs lived on the plains near Denver, which now live near timberline (11,500') on Pikes Peak (Scott 1963). Based on the pollen record of the southwest, Martin & Mehringer (1965, Figs. 3 & 4) show major changes in vegetation of New Mexico between "full glacial" times and now. High plains areas eastward from the mountains (even in Texas) that now are covered by grassland were during "full glacial" time covered by spruce and ponderosa pine parkland, foothill areas that now are covered by pinon-juniper woodland and ponderosa-pine parkland were covered by spruce-fir-pine forest, and high mountains areas now covered by spruce-fir-pine forest were above treeline. Glaciers in the Wet Mountains and Sangre de Cristo Range advanced as low as 8500 ft. (the altitude of modern montane glaciers in Colorado is about 12,000 ft.), several thousand feet lower than their sources. Thus, glaciation was nearly as low as the floor of the Wet Mountain Valley and San Luis Valley and alpine butterflies spread over all the mountainous parts of the area during the coldest pleistocene times. Alpine zone had to extend as low as about 7000' in southern Wyoming for alpine butterflies to enter Colorado from the north; alpine zone was therefore lowered 4000' or more from the present altitude.

On the other hand, interglacial times were sometimes warmer than now. During interglacial times, which were relatively short, the glaciers

melted back to, or nearly to, their sources. The warmth of interglacial and postglacial time is shown by molluscs in one late middle Pleistocene interglacial deposit near Denver that are the same as those in Altithermal (postglacial — about 5,500 to 4,500 years before the present) deposits near Denver and the same as those now living in southern Texas, New Mexico, and Arizona (Scott 1963). During the interglacial parts of the Pleistocene and during Holocene (post-Pleistocene) time the alpine and arctic species almost certainly would have moved up into the mountains to altitudes as high or higher than they now live. For instance, greater warmth in Altithermal time than now probably caused the current absence of alpine, but not subalpine, species on Greenhorn Mountain; even though there are extensive alpine areas there now. Its altitude of only 12,349 ft. probably resulted in a climate too warm to be tolerated by alpine butterflies. Assuming that the butterflies were eliminated from the peak, they were then unable to return because the climate never again was cold enough to permit them to cross the Wet Mountain Valley from the higher Sangre de Cristo Range. During the warmest interglacial times pinon-juniper woodland probably extended nearly to the summit of low passes in the Sangre de Cristo Range such as Mosca Pass, allowing greater dispersal of lowland butterflies than is possible today.

Zoogeography of the Species in Comparison with the Remainder of Colorado

This area is warmer and drier than the Front Range area near Denver, and this is reflected in the butterfly fauna as well. Thirteen species occur at lower altitudes in the Front Range near Denver than they do in the Pueblo area, and two species which occur at mid to low altitude in the Front Range are nearly restricted to the alpine zone in the Sangre de Cristo Range. Several species which occur as two altitudinal phenotypes in the Front Range (*Lycaena rubidus*, *L. heteronea*, *Hesperia comma*) are represented here only by the low-altitude phenotype.

Another phenomenon of distribution in Colorado seems to involve the same meteorological phenomenon. Nine species are missing in the foothills and plains area near Denver, but fly in areas both north and south of Denver (*Satyrrium sylvinus*, *Chlosyne acastus*, *Cercyonis meadii*, *Euphilotes rita*, *Apodemia mormo*, *Amblyscirtes simius*, *Yurretta rhesus*, *Atrytonopsis hianna*, *Megathymus streckeri*). These species occur in the Arkansas Valley area and usually near Colorado Springs, are absent in the Denver area and usually in the Black Forest north of Colorado Springs, then reappear northward in Larimer County, Colorado (which is drier), southeastern Wyoming, or in the case of *M.*

streckeri, in Montana. Several of these species occur continuously around the circumvented Denver area.

The Black Forest is a higher eastern extension of the ponderosa pine forest between the Pueblo area and Denver to the north. Some species circumvent but are missing in the Black Forest apparently because it is too cold, and at least 16 species extend farther east of the mountains in the Black Forest than they do along the Arkansas River.

The Pueblo area contains 178 of the 247 species known for Colorado, or 72%. The distributions of the 247 Colorado species are listed in Table 2. The area east of the Continental Divide is somewhat richer than the area west of it, but there is very little difference in species richness in the north or south. There is no abrupt north-south break in species distributions, instead there is a gradual change in species composition north to south.

The distribution east of the divide of those species also occurring west of it was analyzed. The number of these west-slope species varies by only 2 or less in any area along the eastern slope mountains and adjacent plains. Therefore the faunas of the Pueblo area and of the Front Range are about equally related to the western slope, in spite of gradual change in composition of western-slope species along the eastern slope corridor. For instance, 18 west-slope species occur in the Pueblo area, but not in Larimer County on the northern edge of the state, and 16 west-slope species occur in Larimer County, but not in the Pueblo area.

To determine the relationship between the fauna of the Pueblo area and the rest of North America, distributions of the 160 native species were analyzed: 25 species are widespread in the U.S.; 61 occur only in western North America and sometimes (17) extend eastward across southern Canada, 17 occur mainly in the Rocky Mountains, 34 occur in southwestern U.S., 5 occur in eastern and southern U.S., and 18 occur mainly in eastern U.S. (6 only northeastward). These data clearly show that the fauna is western, with a smaller amount of other elements.

Geographic Variation

Eleven species have a different phenotype in the Pueblo area than elsewhere: *Hesperia comma*, *Polites sabuleti*, *Poanes hobomok*, *Oeneis alberta*, *Cercyonis meadii*, *Chlosyne damoetas*, *C. acastus*, *Apodemia mormo*, *Callophrys mossii*, *Celastrina argiolus*, and *Euphilotes spaldingi*. Five species differ geographically within the area: *Megathymus yuccae*, *M. streckeri*, *Speyeria atlantis*, *Cercyonis pegala*, and *Plebejus shasta*. Four species have different altitudinal forms: *Parnassius phoebus*, *Euphydryas chalcedona anicia*, *Lycaena helloides*, and *Plebejus acmon*. Details are given under the species accounts.

Species restricted to few habitats

Butterfly "communities" do not exist except as statistical associations of species with similar climate requirements or resources (foodplants). Below we mention those species most restricted to a conspicuous type of vegetation association. There are of course other associations between butterflies and plants due to their restricted feeding habits.

1. Alpine zone. Four strictly alpine species occur in the Pueblo area: *O. melissa*, *E. magdalena*, *C. damoetas*, *L. cupreus*. Three others (*P. shasta*, *C. meadii*, and *P. centaureae*) are alpine and subalpine. Only the latter three species are in the Wet Mountains. Perhaps the four alpine species did extend to the Wet Mountains (Greenhorn Peak is 12,349 ft. and above timberline) in the Pleistocene, but became extinct during the warmer period following the last glacial advance. The Sangre de Cristo Mountains north of Hayden Pass are narrower and are poorer collecting than south of the pass, but all of these seven species except *O. melissa* are known north (in addition to south) of this pass.
2. Riparian habitats. Many species occur mostly along riparian vegetation (growing along streams) or wet meadows, including *P. rutulus*, *P. multicaudata*, *C. scudderii*, *P. napi*, *D. plexippus*, *L. archippus*, *L. wiedemeyerii*, *P. faunus*, *N. antiopa*, *S. atlantis*, *P. tharos*, *C. nycteis*, *B. freija*, *B. selene*, *S. sylvinus*, *S. acadica*, *L. rubidus*, *L. helloworldes*, *L. hyllus*, *L. xanthoides*, *P. saepiolus*, *E. comyntas*, *P. pirus*, and *A. delaware*. These species feed as larvae on plants growing along streams or in wet meadows.
3. Pinon-juniper woodland. Many species occur in this woodland, but the only species that are mostly restricted to it are *P. bairdii*, *C. acastus*, *E. dorothea*, *C. nelsoni*, *E. spaldingi*, *S. morrisoni*, *H. pahaska*.
4. Chaparral. *S. behrii* and *O. edwardsii* occur mostly in *Cercocarpus* chaparral.
5. Grassland. Only a few species seem mostly restricted to grasslands, or at least to grassland areas with few to no trees: *P. scriptura*, *Y. urhesus*, *H. uncas*, *H. leonardus*. The first three occur on grasslands from the plains to the intermountain parks. Many more species occur mostly in medium altitude grasslands where aspen groves are frequent in moist swales: *T. mexicana*, *H. nevada*, *E. icelus*, *E. persius*, *P. xanthus*, *P. sonora*, *P. draco*, *C. alexandra*, *O. uhleri*, *O. alberta*.

Effect of geology on distribution of butterflies

Geology seems to effect distribution of a few species. The directness of the link between a butterfly species and geology varies greatly from a butterfly species that feeds on only one species of plant which can grow in only one type of geologic formation in a narrow range of altitude to a species that feeds on many plants which grow on many geologic formations in a wide range of altitude.

A good example of a butterfly restricted to one rock type is *Euphydryas editha* in California (Johnson et al. 1968) which is usually restricted to serpentine outcrops.

We can link only a few of the butterflies in the Pueblo area closely to the chemistry of the rocks or soil. They are all mainly low altitude species: *Chlosyne leanira* — foodplant *Castilleja integra* which at least at altitudes of 5000-7000 ft. grows on limestone or on gypsum deposits or calcareous soils developed on either surficial deposits or on bedrock; *Pieris chloridice (beckeri)* — foodplants Cruciferae and Capparidaceae mostly growing on gypsiferous shale or claystone; *Phycoides picta* — foodplant *Aster* growing on gypsiferous shale or on alkaline soils; *Pholisora alpheus* — foodplant *Atriplex canescens* which grows on alkaline soils; *Pholisora mejicana* — foodplant *Amaranthus* species growing on alkaline soils. Probably other butterflies do use foodplants that are restricted to certain soils or rocks, but confirmation of this would require a special study.

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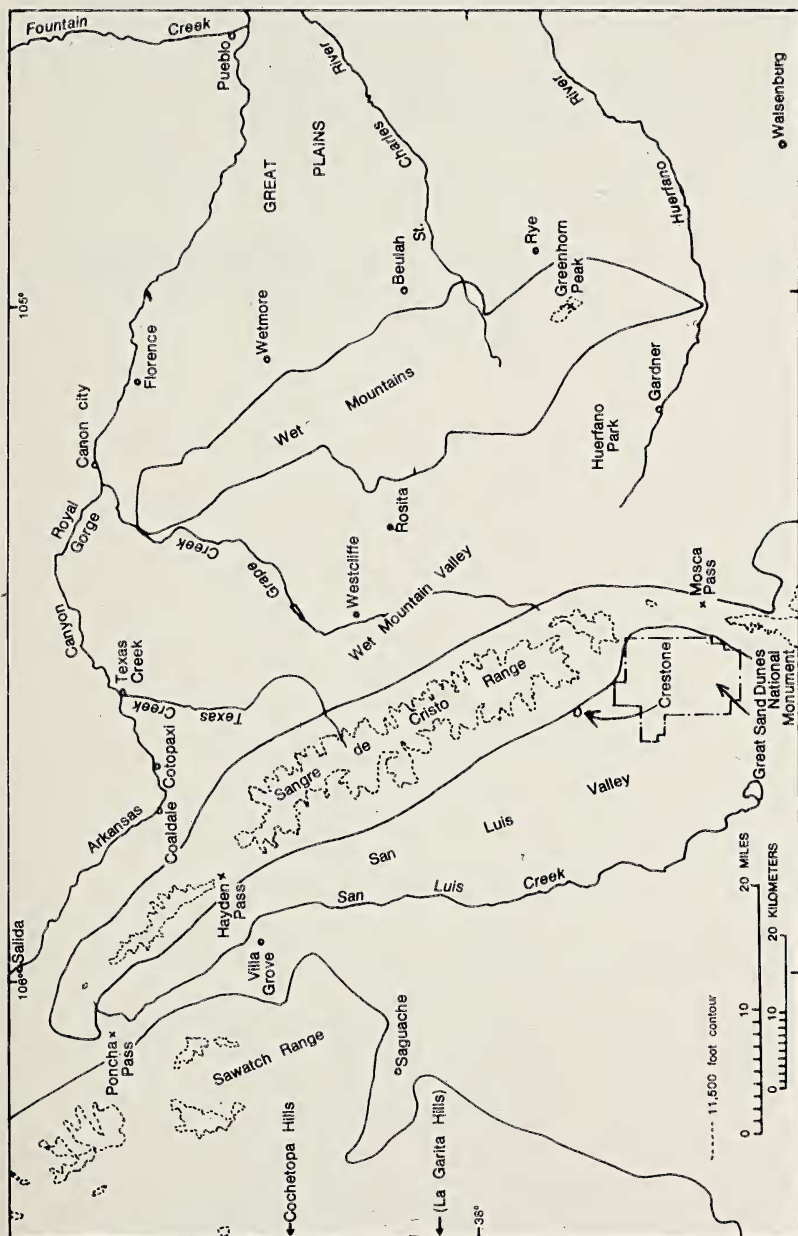


Fig. 1. Outline Map derived from the Southern half of the Pueblo Quadrangle (1:250,000) giving names of the physical features and some towns.

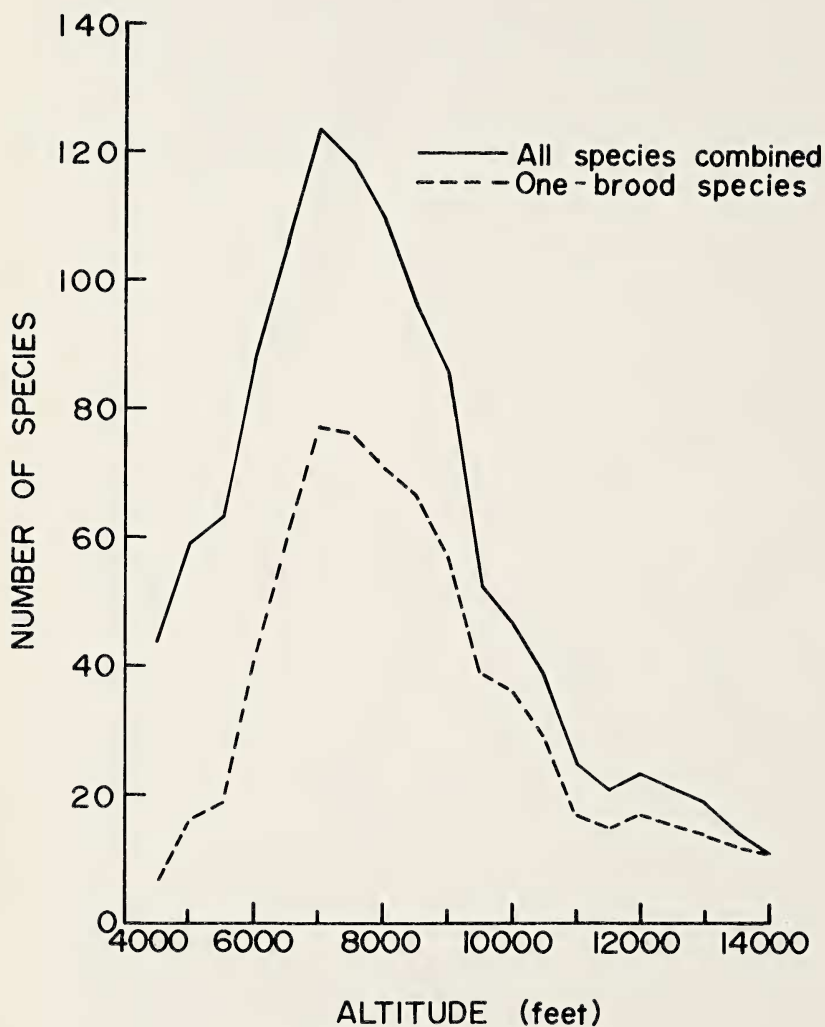


Fig. 2. Number of native species occurring at each altitude.

Table 1. Distribution of the 160 native species within the Pueblo area.**Group 1** Widespread

- 40 species occur throughout the area (although only 9 of these occur at all elevations and all 9 disperse widely except that *Nymphalis milberti* and *Plebejus acmon* apparently breed above timberline).
- 47 species occur throughout the mountains (only 4 also occur in the alpine zone).

Group 2 More restricted in distribution apparently due to limited habitat or altitude requirements.

- 15 occur at middle altitudes throughout the mountains
- 6 occur in subalpine areas of all three ranges
- 6 only in alpine areas
- 6 only on the plains
- 6 only in the Wet Mountain foothills
- 3 plains, Arkansas Canyon, and San Luis Valley (*Pieris chloridice*, *Pholisora alpheus*, *Megathymus streckeri*)
- 1 Wet Mountain Valley and San Luis Valley (*Boloria selene*)
- 2 Arkansas Canyon and San Luis Valley (*Chlosyne acastus*, *Polites sabuleti*)
- 2 Arkansas Canyon, Wet Mountain Valley, and San Luis Valley (*Euphilotes rita*, *Lycaena heteronea*)
- 1 plains and San Luis Valley (*Limenitis archippus*)
- 3 plains, foothills, and Arkansas Canyon (*Euchloe olympia*, *Erynnis afranius*, *Atalopedes campestris*)
- 2 plains, Arkansas Canyon (*Atrytonopsis vierecki*, *Phyciodes picta*)
- 2 plains, foothills (*Asterocampa celtis*, *Everes comyntas*)
- 4 foothills, Arkansas Canyon (*Pholisora mejicanus*, *Oarisma edwardsii*, *Amblyscirtes aenus*, *A. vialis*)

Group 3 Species which occur only on one side of the Sangre de Cristo Mountains and are absent on the other side in apparently suitable habitats.

- 2 plains and Wet Mountain Valley (*Lycaena hyllus*, *Brephidium exilus*)
- 4 throughout the area except the San Luis Valley (*Chlosyne gorgone*, *C. leanira*, *Cercyonis pegala*, *Amblyscirtes osleri*)
- 3 Wet Mountain foothills, Arkansas Canyon, Wet Mountain Valley (*Satyrrium liparops*, *Thorybes pylades*, *Erynnis horatius*)
- 1 plains, foothills, Wet Mountain Valley (*Chlosyne nycteis*)
- 4 San Luis Valley only (*Cercyonis meadii*, *Euphilotes spaldingi*, *Polites sonora*, *Oeniscus alberta*)

Table 2. Distribution of the 247 butterfly species of Colorado.

-
1. 30 species are strays from the south which usually appear on the eastern plains.
 2. 54 are widely distributed in the state.
 3. 105 occur in the mountains on both slopes of the Continental Divide (9 are primarily subalpine species, and 8 are primarily alpine species).
 - a. 69 occur throughout the mountains in suitable habitats
 - b. 9 occur throughout the mountains and extend out onto the plains in some areas.
 - c. 8 occur only in the northern mountains
 - d. 3 occur only in the southern mountains
 - e. 1 occurs throughout the mountains except for the Front Range
 - f. 7 occur mostly throughout the mountains except for the Wet and Sangre de Cristo Mountains and San Luis Valley
 - g. 2 occur throughout the mountains except for northwestern mountains.
 - h. 3 occur in parts of the alpine areas of the state but are continuously distributed there
 - i. 3 occur in widely disjunct areas of the mountains
 4. 38 occur only east of the Continental Divide.
 - a. 7 occur only in mountains
 - b. 5 occur both in the mountains and the plains
 - c. 13 occur mostly on the plains where they are widespread
 - d. 5 occur only in the northeastern plains
 - e. 4 occur only in the southeastern plains
 - f. 4 occur only on the eastern plains near Kansas
 5. 17 occur only west of the Continental Divide.
 - a. 1 occurs throughout the mountains
 - b. 4 occur only in the northwestern mountains
 - c. 1 occurs only in the southwestern mountains
 - d. 4 occur only in the southwestern corner of the state
 - e. 7 occur only on the western edge of the state near Utah
 6. 3 species occur widespread across the southern part of the state.